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DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.

The Minister of Transport

ALTHOUGH the Hon. Oliver Stanley has held the office of Minister of Transport only for the brief period of 16 months, he has, during this time, added both to his own prestige and also to that of the Ministry by the able way in which he has dealt with the many delicate problems associated with the co-ordination and stabilisation of transport in this country. He assumed office in time to handle the final stages in Parliament of the original London Passenger Transport Act; to introduce and carry through the Road & Rail Traffic Act, 1933, with its important provisions for more elasticity in fixing railway rates; and to introduce the present Road Traffic Bill. The measures of the Government to deal with the licensing and control of goods-carrying road vehicles have proved as broadly satisfactory to all sections of the transport industry as could any restrictive enactment, while the popularity of agreed charges is sufficiently evidenced by the number of applications to the Railway Rates Tribunal for approval to such arrangements. Mr. Leslie Hore-Belisha, whose portrait we publish on page 61, thus takes over control of a department which has recently shown itself fully conscious of the modern needs of co-ordinated transport. Like his predecessor, he is a barrister, and this training should stand him in good stead in his new office as Minister of Transport, in which he carries the good wishes of all concerned with the prosperity and efficiency of transport in its various branches.

Three Months' Goods Train Traffics

Attached to the Ministry of Transport statistics for the month of March, 1934, is an analysis of the goods train traffics and receipts of all standard gauge railways in Great Britain for the twelve weeks ended March 24, 1934, and a comparison with the corresponding period in 1933. Although livestock shows a decrease of 3.79 per cent. in the number carried with an increase of only 0.69 per cent. in receipts, there is a general and substantial improvement under each of the remaining three main headings. Of higher class merchandise 10,977,491 tons were carried in the 12 weeks of 1934, an increase of 1,249,877 tons or 12.85 per cent., producing receipts of £9,122,409, which were higher by £824,506 or 9.94 per cent. The difference in the percentage increases in tonnage and receipts may be due to some extent to lower scales of rates adopted to meet competition. In minerals and merchandise (Classes 1 to 6) the amount carried was 11,582,189 tons, an increase of 2,782,201 tons or 31.62 per cent., with receipts of £3,098,992—an advance of £680,220 or 28.12 per cent. Some 44,229,904 tons of coal, coke and patent fuel were carried, an increase of 2,953,930 tons or 7.16 per cent., producing receipts of £8,383,524, which were higher by £513,923 or 6.53 per cent. than those for the corresponding twelve weeks in 1933. In working the 13.33 per cent. additional ton-mileage and the 11.62 per cent. additional tonnage there was an addition of 7.21 per cent. to the freight engine mileage.

* * * *

The Week's Traffics

For the 27 weeks of the current year the railway traffics of the four group companies together are estimated at £74,127,000, an increase of £3,616,000 or 5.13 per cent. in comparison with the corresponding period in 1933. In passenger train traffics the net increase is £248,000, merchandise earnings are £2,362,500 better, and the improvement in coal traffics is £1,005,500. The London Transport return is for the first week of its second year. It shows receipts (before pooling) of £552,100 which are £52,000 higher than for the corresponding week of 1933, but it must be noted that this year's takings include receipts of bus and coach undertakings not absorbed at this time last year.

	27th Week				Inc. or dec.	
	Pass. &c.	Goods, &c.	Coal, &c.	Total.	Year to date	%
L.M.S.R. ..	+ 9,000	+ 38,000	+ 9,000	+ 56,000	+ 1,478,000	+ 5.19
L.N.E.R. ..	+ 5,000	+ 3,000	+ 12,000	+ 20,000	+ 1,499,000	+ 7.30
G.W.R. ..	- 7,000	+ 9,000	- 5,000	- 3,000	+ 396,000	+ 3.32
S.R.	+ 8,000	+ 3,000	—	+ 11,000	+ 243,000	+ 2.54

Irish railway traffics for the past week show advances, the Belfast & County Down having an improvement of £49, the Great Northern one of £2,500, and the Great Southern one of £5,713. To date the Great Northern has an increase of £147,900, and the Great Southern one of £76,855.

* * * *

Leopoldina Railway Troubles

Some of the difficulties with which the Leopoldina Railway is faced were indicated in the annual report on which we commented last week. At the annual meeting on July 9 Mr. Oliver Bury, the Chairman, amplified these disabilities. Net receipts for 1933 were the worst of any year since 1900. From coffee, the best revenue-producing traffic, the receipts were £246,214 lower than in 1932, due to special circumstances connected with the national policy of control, the freight difference in that item alone having exceeded the total decrease in the company's currency revenue. Then there was the further loss of £173,357 on exchange, due to the fact that notwithstanding the special arrangements made last July, a sum of £515,511 was still

owing from the Brazilian Government at the close of the year, and the company had to purchase drafts on the outside market at a lower rate of exchange. Again, owing to the refusal of the authorities to allow any increase in the present fares which involved an actual loss, the railway company had to pay £62,568 to the Leopoldina Terminal Company under its guarantee. The Terminal is a holding company deriving almost all its income from a local company, which operates a ferry between Rio and Nictheroy and tramways in Nictheroy. Finally, the railway company has been required by a Government Committee to increase its payroll by about £75,000 per annum.

* * *

Overseas Railway Traffics

The Argentine railway traffics shown last week completed the returns for the financial year ended June 30 and indicated the following increases:—Buenos Ayres & Pacific £109,000, Cordoba Central £92,000, Entre Rios £26,800, and Buenos Ayres Western £9,000, while the decreases on the Buenos Ayres Great Southern and the Central Argentine were reduced to £42,000 and £376,000 respectively. So far as shareholders are concerned, however, this improvement is more apparent than real owing to the exchange position. The figures given in sterling for the financial year just ended were at the par rate of exchange, but the variation in the sterling value of the Argentine paper peso has lately been so great that this method of conversion has proved misleading, the amount being overestimated. From July 1, accordingly, pesos are being converted at the average official rate ruling during each week, with the result that though receipts in currency are improving, receipts in sterling are substantially down.

Railway.	No. of Weekly Week. Traffics.	Increase or Decrease. £	Aggregate Traffic. £	Increase or Decrease. £
Buenos Ayres & Pacific ..	1st	70,201	— 25,903	—
Buenos Ayres Great Southern ..	1st	121,438	— 72,471	—
Buenos Ayres Western ..	1st	45,949	— 23,923	—
Central Argentine ..	1st	125,327	— 52,788	—
Canadian Pacific ..	27th	468,400	+ 5,200	11,910,400 + 1,302,400
Bombay, Baroda & Central India	13th	146,550	— 8,025	2,202,750 + 76,425

* * *

British Guiana Transport

The Transport and Harbours Department of British Guiana controls what was formerly the Demerara Railway, as well as steamer services, the Bartika-Potaro road services, and harbours and pilotage. From the combined services in 1933 there was a net revenue of \$95,969, against \$96,437 in 1932. After allowing for interest and sinking fund charges, the cost of the transport services to the Colony amounted to \$95,464 in 1933, compared with \$95,390 in 1932. The railways total 79 route miles, and consist of two separate sections:—one from Georgetown to Rosignol 60½ miles on the 4 ft. 8½ in. gauge, and the other of 18½ miles on the 3 ft. 6 in. gauge from Vreed-en-Hoop to Parika. Figures in the accompanying table refer to the railways only, the British Guiana dollar being roughly equivalent to the U.S. dollar:—

	1933	1932
Passengers	1,293,472	1,281,299
Tons	86,348	90,103
	\$	\$
Coaching receipts	193,410	192,279
Goods traffic receipts	130,283	136,281
Gross receipts	331,298	337,476
Working expenditure	309,791	316,537
Net receipts	21,507	20,939

The number of passengers carried in 1933 was the highest since the Government assumed control in 1921. The increase in passengers during the past two years is due to the introduction in October, 1931, of third-class fares at half second class rates.

Long Distance Railcar Services

With the inauguration last Monday by the Great Western Railway of fast railcar services between Birmingham and Cardiff we feel safe to say that a new page has been turned in British main line railway practice, although, as we have recorded from time to time, a similar page was turned by Continental railways some time ago. The latest development in France with Bugatti railcars forms the subject of an article on page 58. Details of the new G.W.R. service will be found in our *Diesel Railway Traction Supplement*, and all we need say here is that by means of these light and economical units it has been possible to provide supplementary facilities of an order likely to be highly appreciated by the travelling public. We shall be surprised if the response of the public is not considerable, and we think there is little doubt that similar services will be put into operation in many directions in the near future. It requires no effort of the imagination to think of main lines, both arterial and cross country, on which there are long and awkward gaps between fast trains. It would not be profitable to fill such gaps with normal steam trains with their comparatively high operating and incidental expenses, but now that railcars, the total operating costs of which are much lower, which can provide the limited accommodation necessary combined with comfort and such amenities as the new Great Western cars provide, and which have now reached a stage of sufficient reliability for railway service, it is probable that the railways by adopting this form of traction may tap a useful source of revenue, earn the gratitude of the travelling public and help to ease the growing congestion and dangers of the roads.

* * *

France's Fastest Railcars

The highest railway speed schedule in France is about to pass into the hands of the P.L.M. Railway, and will be achieved with one of the Bugatti railcars, put into service this summer, which are described on page 58. The car is timed to leave Paris at 8.5 a.m. for Lyons, calling only at Laroche and Dijon; the time allowed for the journey of 318½ miles is 4 hr. 40 min., and the return journey from Lyons, begun at 7 p.m., takes the same time. The fastest running will be between Laroche and Dijon; for the 99½ miles the railcar is allowed 82 min. in the southbound, and 80 min. in the northbound direction, which requires an average start-to-stop speed, in the latter case, of 74.6 m.p.h. No stop is made between Dijon and Lyons, the 122½ miles taking 106 min. southbound and 109 min. northbound. The overall time of the railcar is 80 min. less between Paris and Lyons than that of the fastest ordinary steam-hauled *rapide*, which takes 6 hr. The other Bugatti car is being installed on the Paris-Vichy-Clermont-Ferrand route, leaving Paris at 8 a.m., and returning from Clermont-Ferrand at 3.30 p.m.; between Paris and Vichy the time of 3 hr. 54 min. southbound and 3 hr. 44 min. northbound compares with a best *rapide* time of 4 hr. 22 min. Buffet facilities are provided on these new and enterprising railcar services. In addition, a fast service is being run with a Renault railcar between Dijon and Lyons.

* * *

A Belgian Direct Line

Italy is not the only country where the construction of direct cut-off lines has been undertaken of recent years. The new *Direttissima* between Florence and Bologna opened on April 22, and the subject of an illustrated article in our Electric Traction Supplement of May 4, is certainly

the most ambitious work of its kind, but, although from a purely engineering point of view less interesting, the direct line of the Belgian National Railways between Brussels and Ghent is a notable undertaking. We briefly described this line, which, begun before the war, was opened to traffic throughout just over a year ago, in our issue of January 16 last. It begins just outside the Midi station at Brussels, and, after taking a wide curve north-westward, follows an almost straight and easily graded course to Ghent. There is no intermediate station on its 32.4-mile length, but trains can serve certain of those on the old line by means of well-aligned flying junctions. Except at such places, the signalling is automatic throughout. A frequent service of high-speed limited trains brings the transit time between Brussels and Ghent down to a minimum of 33 minutes.

* * * *

Safeguarding Railway Workers' Eyesight

The June issue of the *Bulletin des Chemins de fer Fédéraux Suisses* summarises the results recorded in the railway workshops since a safety order relating to eye protection was published a little more than a year ago. The number of eye injuries to every hundred thousand working hours shows a sharp decline since the beginning of 1933, when the new regulations were introduced, the figure of 2.8 at the end of the first quarter of the present year representing a decrease of 54.2 per cent. The possibility of reducing the number of mishaps still further is urged in the same article, which elaborates the rules laid down in the safety order. The wearing of goggles is strongly advised for all occasions when there is the slightest chance of optical injury from dust or splinters. The set rules cannot embrace all contingencies, and there are many instances in which the discretion of the employee must be the deciding factor. It is pointed out that, apart from common sense, the involuntary partial closing of the eyes when engaged on certain tasks is an infallible guide to the need for protection. Even so, there are always those who will quibble over the regulations, and the article stresses the importance of tackling the danger at its source by keeping hammers, anvils, and similar tools in good condition in order to minimise the striking of splinters.

* * * *

Education of Railway Employees

Systematic training of employees in the more highly technical branches of railway working has been established longer than that for the benefit of what may be called the semi-skilled staff, to which men in the Permanent Way Department generally belong. It has come to be realised, however, that, principally in view of the progressive tendency to increase the loads and speeds of trains, perfection of permanent way maintenance demands far more skill than was formerly considered necessary. In this country, as we have recorded from time to time, much progress has been made in the education of the permanent way staff, particularly on the Southern Railway, which may justly be considered to have taken the lead in the matter. Our articles have evoked widespread interest, which has been manifested in the annual reports of overseas railway administrations. The report of the Kenya and Uganda Railways and Harbours during 1933, which we reviewed in our issue of June 15, mentions that the training of permanent way staff of all nationalities progressed satisfactorily during the year. A system of frequent examinations was introduced to weed out at an early stage apprentices who were unlikely to make good. A correspondence course was also established which met

with general support from the permanent way staff and was compulsory for learners. Papers were forwarded to all literate members, 100 per cent. of whom below the rank of permanent way inspector returned replies. It is added that up to the present a satisfactory method of instructing illiterate members of the staff has not been devised, although these men undoubtedly benefit by contact with the literates who take and understand a correspondence course:

* * * *

Train Resistance Formulæ

During the discussion of a paper on "Steam Motive Power Operation," which Mr. T. H. Shields read recently before the Institution of Locomotive Engineers, Mr. H. Holcroft, referred to the various formulæ used for calculating train resistance. Experiments at the National Physical Laboratory have confirmed that the resistance of a train depends very largely on its make-up. The leading coach offers the greatest resistance, the intermediate ones show a uniform minimum, while the last vehicle offers a slightly greater resistance than that immediately in front of it. Therefore a long train has a relatively smaller resistance per ton than a short one. The Aspinall formula for train resistance takes into account the length of the train and the number of vehicles, and is therefore more in keeping with present knowledge than the simple formula which the author cited in his paper. Another interesting means of estimating train resistance was devised by Mr. Carus-Wilson many years ago, in which he added together the resistances arising from various factors, beginning with that of the journals and flanges. His investigations showed that a long wheelbase bogie with a small amount of sideplay has less resistance than one with a short wheelbase and considerable sideplay. He did not neglect the factor of air, now recognised as being of the first importance and attributable to a variety of apparently minor causes. For instance, if a large number of windows on a passenger train are open there is a very much higher resistance than when they are closed, particularly with a side wind. Similarly, the continuity of a vestibuled train minimises its air resistance.

* * * *

Welded Rolling Stock in Poland

Owing to the almost complete destruction of rolling stock on the railways of Poland at the conclusion of the war, very large orders had to be placed for new material, and intensive production of freight vehicles began without much thought having been given to the most economical designs. Now, owing to the world economic crisis and the universal decrease in business, the Polish railways find themselves over-equipped with wagons which are not economical to work. Great attention is therefore being given to designing new stock in such a way as not merely to cheapen the cost of construction but to reduce running expenses and to improve the ratio of tare to load. From a paper entitled "Welding as a Factor in Railway Rolling Stock Construction in Poland" by Mr. A. Brandt, presented to the International Congress for Steel Development in London in June, we learn that builders of rolling stock have recently been reorganising their works, paying great attention to the selection of engineers qualified to undertake research along the lines indicated. New wagon designs evolved have incorporated welding in place of riveting, with its complement of modified framing and sections, to such good effect that the ratio of tare to load has dropped from 0.615 to 0.405, or 34 per cent., in flat wagons, and from 0.465 to 0.373, or 19.8 per cent. in open coal trucks. Only coated electrodes are used, and very careful control of the welding is exercised.

The Permanent Way Institution

DURING the past week the Permanent Way Institution has been holding a special Jubilee Convention in London to celebrate the fiftieth anniversary of its foundation. The Institution began in a modest way in 1884 under the presidency of Mr. William Lewis Meredith, who was then employed on the old Midland Railway in the Nottingham district. It was customary in that centre for the staff to meet for an annual dinner, and Mr. Meredith, who in 1883 accepted an invitation to attend, took the opportunity to introduce in his speech the subject of technical training. This resulted in the formation of what is now the P.W.I. under the title of the Institution of Permanent Way Inspectors. At the outset its object was to further the knowledge and experience of that important body of men in their daily work. After fifty years of work this principle is still its main feature, and although the institution has widened its scope, changed its name in 1895 to the Permanent Way Institution, and has a membership extending to most of the British Dominions and Colonies, full membership is still limited to inspectors engaged in the railway civil engineering service. Many chief and divisional engineers, as well as their general assistants, are fellows or associate fellows, while gangers and plate-layers to a large number fill the ranks of associated members.

It is believed that the P.W.I. is unique in thus joining in voluntary association all ranks of the railway civil engineering service. In order to appreciate fully the success of the Institution during its half century of existence, it is necessary, moreover, to recall that no pecuniary or insurance inducements to membership are offered. Conditions of service or rates of pay are not dealt with at its meetings, and it does not provide for any sick or other benefits to its members, with the exception of a small benevolent fund. It has sections which meet regularly at many of the large railway centres in this country, and in one year as many as 130 meetings are held, at which voluntary lecturers read papers of an educational character. From a membership of 129 in the foundation year, the total reached the thousand mark by 1908, the year in which, on October 9, the Institution was incorporated, under the presidency of the late Mr. William Willox, then Engineer of the Metropolitan Railway. At the present time the membership is approximately double that figure, and, in addition to the unattached members to be found all over the world, some 190 are banded together locally in a Malayan section, formed in 1921, which holds its own local meetings, and about 50 in a similarly constituted Sudan section, formed in April, 1928.

From its beginning the summer conventions of the Institution have proved an ideal way of combining the social and educational features of its work; the first was held in Birmingham in June, 1885. In the early days cheap travelling facilities were limited, there were neither special passes nor privilege ticket concessions, and even special leave for those wishing to attend the meeting was extremely difficult to obtain. Probably the most notable convention was that held in Paris in 1914, on the eve of the war, which was almost as memorable for the lavish hospitality extended by the French hosts as for the critical period at which it took place. Mr. W. Cleaver, Engineer, Port Talbot Railway & Docks, was then President, and owing to the war his term of office continued until 1920. The presentation made to him on behalf of the members by the late Mr. W. Willox at the 1920 winter dinner expressed the universal gratitude of the members for the able way in which he had piloted the institution through those times of stress and anxiety. The Belgian convention in 1921, under the presidency of Mr. John Miller, then

Chief Engineer, Great Eastern Railway, was the largest of its kind. Over 400 members and ladies attended when a visit was paid to the battlefields, to Antwerp, and to Brussels. The undoubted success of the Jubilee Convention, now just concluded, is sufficiently indicated by the account which we publish on another page. A special souvenir of the occasion has been prepared by our associated monthly publication, *The Railway Engineer*, and copies have been presented to all P.W.I. members, as well as being issued as a supplement to the July issue of *The Railway Engineer*. In his foreword to this souvenir, the present President of the P.W.I., Mr. Arthur R. Cooper, Chief Engineer, London Passenger Transport Board, happily expresses both the justification and the object of the Jubilee Celebrations when he says, "In some ways a jubilee is more interesting than a centenary, for it is a period which can be compassed by the ordinary memory, in fact even the working life of a man, whereas a centenary is rather an historical period with which one cannot feel any personal connection. Such an event as the Jubilee is certainly an occasion on which some review of what has been achieved, the present position, and the aims of the future, should be made."

Paris, Lyons & Mediterranean Railway

NOTWITHSTANDING the continual efforts of the management in the shape of improved services, new rate and fare concessions, and methods of real economy the financial results achieved in the year 1933 were even less favourable than those of the previous year. Trade depression and the more intense competition from road vehicles and waterways were responsible for these conditions. Recent legislation has, however, begun to have its effect. The reduction of taxes on passenger fares and on de luxe supplements which became operative on November 1 last increased the company's receipts during the last two months of the year by fr. 18,000,000, and the new law operating as from January 19, 1934, promises to give the company some of that elasticity in tariffs and in working conditions which its competitors have so long enjoyed. Moreover, the National Economic Council after a close study of the subject, has recently reported on the necessity of regulating all forms of transport, and the President of the Republic has recognised its importance.

With a decrease of fr. 138,209,137 in receipts, there was a saving of fr. 127,957,779 in expenses and the loss on working in 1933 was increased by fr. 10,251,358 in comparison with 1932. Capital charges advanced from fr. 834,591,071 to fr. 836,099,926, the smallness of the increase being due to the curtailment of the works and rolling stock programme and to the saving in interest caused by redemption of certain foreign loans, and the final result for 1933 is a deficit of fr. 946,258,495, comparing with a deficit of fr. 935,612,012 for 1932. The dividend on each 500 fr. share is 70 fr., the same as in 1932, and compares with 80 fr. in 1931, and 85 fr. in 1930. Passenger receipts increased by 0.22 per cent., but would have been 2.1 per cent. lower had it not been for the tax remission above mentioned. Numerous accelerations have been provided, conditions of admission to express trains have been widened, and special cheap facilities have been provided to and from the Littoral which have proved most successful. For the Holy Year celebrations in Rome the company ran 59 special pilgrim trains. First and second class passenger receipts together constituted 36.7 per cent. of the total passenger receipts in 1933, as compared with 37.2 per cent. in 1932, and 41 per cent. in 1931, although their numbers were only 8.50 per cent., 8.70 per cent., and 9.40 per cent. of the respective totals in the three years. *Grande vitesse* receipts declined 3.1

per cent., and *petite vitesse* receipts 6·4 per cent. The chief decreases in p.v. tonnage were in cereals 22 per cent., building materials 22 per cent., lime and cement 17 per cent., and wines and spirits 8 per cent. In minerals, on the other hand, there was an increase of 38 per cent. There was a slight decrease (0·3 per cent.) in goods train-kilometres, with no appreciable change in passenger train-kilometres. The accompanying table compares some figures for 1933 and 1932, the present exchange being about 76½ French francs to the £.

	1933	1932
Average kilometres worked ..	9,949	9,914
Total train-kilometres ..	112,911,092	112,548,037
Passengers	89,150,109	95,984,686
Ton s, p.v.	32,414,863	34,675,072
Ton-kilometres, p.v. ..	8,009,312,725	8,537,248,954
Average haul, p.v. ..	247·09 km.	246·21 km.
Operating ratio, per cent. ..	102·34	101·93
	Francs	Francs
Passenger receipts	745,278,059	743,631,875
Grande vitesse	551,852,156	569,023,995
Petite vitesse	1,856,191,265	1,982,665,092
Total receipts	3,186,422,315	3,324,631,452
Total expenses	3,260,986,509	3,388,944,288
Loss on working	74,564,194	64,312,836

Seventy-one new locomotives were placed in service during the year, and a beginning was made with the modification of locomotives on the general principles initiated by the Paris-Orleans Railway and since followed with outstanding success by other railways. We illustrate and describe on pages 50 to 53 of this issue the first of the standard P.L.M. Pacifics so rebuilt, and record the remarkable results achieved by it on test. This rebuild differs in detail but not in principle from those of the P.O.

Three loco-tractors for shunting purposes were added to stock in 1933, and of the 22 railcars ordered in 1931 14 were in service during 1933, and the remainder have been delivered. During the year 3 Bugatti railcars and trailers,* 20 containers, 400 wagons (to the English loading gauge) for use on the Dunkerque-Dover train ferry, and 150 special ballast wagons for simplifying track work were ordered. By the end of 1934 the work of fitting all goods vehicles with continuous brakes is expected to be completed. Permanent way renewals during the year amounted to 554 kilometres of single track against 300 in 1931 and 200 in 1932. There are now 59 omnibus routes operated by the *Société auxiliaire de transports du Réseau P.L.M.*, of which 35 parallel the railway, rendering possible the partial or total abolition of unprofitable train services, and giving improved communications. Seven sets of light high-speed trains at greatly reduced fares have been put in operation between Lyons and St. Etienne. Door-to-door goods services have been further developed, and country lorry services have been inaugurated. On the expenditure side payments to the staff, which amounted to over 56 per cent. of the working expenses, were reduced in 1933 by fr. 86,000,000 in comparison with 1932, and in fuel costs there was a saving of fr. 19,000,000. Permanent way expenses were reduced by fr. 20,000,000.

The company also operates a system of railways in Algeria. Throughout the year 1,207 km. were worked, the 29 km. between Marengo and Chercell having ceased to be worked in the course of the year. An arrangement was entered into on October 6 last between the Governor-General of Algeria and the company, under which for ten years from November 1, 1933, there is to be a joint administration of the two main Algerian systems, the P.L.M. and the State Railways. The Algerian lines like those in France felt the effects of the economic crisis and of road competition, and the total deficit for the year amounted to fr. 68,500,000.

* These are referred to on pages 58-59 of the present issue.

Transport in the Irish Free State

ON June 12, 1933, was passed the road Transport Act of the Irish Free State, which, together with the Railways Act of the same year, has placed the Great Southern Railways Company in an unique position as a transport system. The Free State Railways Act of 1924 gave it a railway monopoly under stringent regulation, but even in its first complete year (1925) it was subjected to severe competition from unregulated road transport, the magnitude of which had not been realised at the time of the passing of the 1924 Act. To some extent the company's position was strengthened by the passing of the Railways (Road Motor Services) Act, 1927, which enabled it to run passenger road services on routes approved by the Minister of Industry and Commerce, but in the Act were restrictions and obligations from which other road operators were free. An agreement was entered into in 1927 for co-operative working between the Great Southern Railways Company and the Irish Omnibus Company, which came to have services covering the greater part of the Free State. The railway company gradually increased its interest in this concern and eventually obtained control of it at a cost of £85,000. The Railways Act of 1932 removed all restrictions on the railway companies in regard to road passenger services, including those imposed by the 1927 Act, but in no way regulated operators of goods road services. In 1932 the railway company acquired control of John Wallis & Sons, which had acted for many years as its ordinary cartage agent, and the entire service of this firm was reorganised and improved so that all traffic could be collected and delivered (door-to-door service) at an inclusive rate.

By the Free State Railways Act of 1933 the railway company secured power to discontinue—subject to the consent of the Minister of Industry and Commerce—unprofitable railway services provided that satisfactory road services were substituted. But against that the company's capital was drastically cut down, and it has to shoulder the burden of baronial guarantees of which it had been relieved for ten years by legislation. In consequence of the reduction of capital the company's standard revenue has been cut down by the Railway Tribunal so as to allow the earning of only 5 per cent. on the ordinary capital, which has been reduced from £7,767,123 to £776,713. The general effect of the Road Transport Act of 1933 is to grant a controlled monopoly outside certain specified exempted areas to the three great existing statutory transport companies, i.e., the Great Southern Railways, the Great Northern Railway (so far as the Free State is concerned), and the Dublin United Tramways. This monopoly applies both to passenger and goods services, which all require licences, these three companies being able, with the consent of the Minister of Industry and Commerce, to obtain transfers of licences previously granted to other undertakers, subject to compensation to employees of those undertakers in certain events. Charges for merchandise carried by road are subject to the jurisdiction of the Railway Tribunal. Applications for the passenger transfers required have been made by the three statutory undertakings within the year stipulated by the Act, and many goods undertakings have also been transferred to them, although in the case of goods no time limit is imposed by the Act. On the Great Southern Railways the effect of the new road transport legislation has undoubtedly been beneficial, its receipts for the first half of the present year having increased by about £77,000. From all accounts it has also been a good thing for transport generally. Any risk of unfair charges by the new controlled monopoly is removed by the regulation of rates by rail and road which is provided jointly under the new Acts.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Passenger Complaint Books

Fonthill Abbey, Wilts.

July 9

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—With reference to the very interesting account in THE RAILWAY GAZETTE of July 6 of the passenger complaint book at Boxmoor station, London & Birmingham Railway, it would be interesting to know whether such books were ever in general use, and, if so, for how long. One was in use in 1832 on the Canterbury & Whitstable Railway, and some years ago I came across a reference to it in the company's minute book. So far as I am aware, however, there is no public record of how many complaint books have survived, and whether any are in public custody.

Yours faithfully,

REGINALD B. FELLOWS

[The mention which the Rev. R. B. Fellows makes to the reference in the Canterbury & Whitstable minute book is recorded by him on page 44 of his "History of the Canterbury & Whitstable Railway" as follows:—

PASSENGERS' COMPLAINTS.—The following notice was

printed and posted at the two railway stations and "at the top of each van for passengers" by order of the Directors:—

"The Directors particularly request that any misconduct or incivility of their servants may be noticed in the complaint book kept at the offices at each end of the railway, which will be laid before the Board at their Meetings on the first and third Mondays in each month."]

Recovering Lost Time

9, Strathearn Road, Edinburgh.

July 9

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—My opinion, for what it is worth, on the subject of speed restrictions, is that it is impossible to calculate accurately the safe speed, on the physical bases enumerated by Lord Monkswell, or on any others, and that, so far from being easy, it is very difficult to lay down a limitation which will permit an approximately maximum safe speed. I somehow feel that such a divergence of view can hardly be explained as a misunderstanding.

Yours faithfully,

REGINALD PETERS

PUBLICATIONS RECEIVED

The Universal Directory of Railway Officials and Railway Year Book, 1934-35. London: The Directory Publishing Co. Ltd., 33, Tothill Street, Westminster, S.W.1. 577 pp. 8½ in. × 5½ in. Price 20s. net.—*The Universal Directory of Railway Officials*, originally issued in 1895, reaches with the present volume its fortieth year of publication, and its second edition incorporates another old-established book of reference, *The Railway Year Book*, which completed its thirty-fifth year of publication in 1932. In previous years the two publications overlapped to a certain extent, particularly in the matter of the lists of railway officials. *The Railway Year Book* was devoted more particularly to information concerning railways in the British Isles, while the outstanding feature of *The Universal Directory of Railway Officials* was the comprehensive lists it contained of the officials of railways throughout the world. The present volume continues to incorporate the most useful features of both publications, as well as much other information. Furthermore, opportunity has been taken this year to include additional features in the section covering statistical and other information.

The increasing development in the electrification of main line steam railways has necessitated the complete overhaul of the tabulated statement of such changes, while a new page has been added regarding the nomenclature of electric locomotive wheel arrangements.

British railway interests in road transport are shown in a new financial table which covers both passenger and freight activities, and the list of omnibus in-

terests and working arrangements has been retained and revised to date.

Other new features comprise a précis of important facts and figures about British railways, extracted from a booklet prepared by the British Railways Press Bureau; a list of British consulting engineers to various railway administrations; and a table of currency rates of exchange with the leading countries of the world.

The lists of railway officials remain, brought up to date, and brief descriptions of the chief railway systems of the world, with the latest available financial results, have been added. Besides the railway systems proper, information is given concerning governmental and other authorities exercising control over railways. In amalgamating these two annual railway works the opportunity was taken of adopting an entirely new arrangement of setting out the information. Hitherto there was no differentiation in *The Universal Directory of Railway Officials* between large and small railways, and beyond stating the length, gauge, equipment of locomotives and rolling-stock, no other information apart from the list of officials was given in that publication. In the present volume, as in last year's, the entries regarding the more important railways begin at the top of a page, and a concise description is given of all the larger railway systems throughout the world.

The general arrangement of the book is on a geographical basis, and the order in which they appear has been selected so as to group all the railways in the United Kingdom, the British Colonial Empire and the Dominions in sequence, followed by the railways of

foreign countries in which important British interests are held, and lastly, the railways of other foreign countries. With the present volume, further assistance in communicating with foreign railways is provided by a list, in English, French, German, and Spanish of approximately comparable titles of officials. A further list shows London offices and agencies of the chief overseas railway administrations.

For ready reference purposes, at the end of the volume will be found four indexes: (1) an index to countries; (2) an index to statistical and other information; (3) an index to railways, &c.; (4) a personal index of railway officials.

Last year the amalgamation of the two old-established volumes resulted in the production of what is probably the most complete railway reference book ever compiled, and the additional features which have been incorporated in the 1934-35 edition have still further increased the utility of the volume in directions which the past year's experience have shown to be most desirable.

British Engineers' Association—Handbook, 1934. London: 32, Victoria Street, S.W.1. 8½ in. × 5½ in. Pp. 299. Free on application.—Like its predecessors, the 1934 edition of the B.E.A. Handbook is designed to promote closer contact between home and overseas buyers and engineering firms in this country who are members of the Association. The latter are listed alphabetically, with particulars of their manufactures, the addresses of their London offices, and other details. Manufactures are also classified separately at the end of the book, with the firms producing them. The early pages summarise the objects and activities of the association.

THE SCRAP HEAP

Messrs. The Grimsby Fish Trawling Co., Grimsby.

Dear Sirs,—Enclosed please find P.O. value 2s. Kindly send me basket of fish, as per advertisement in the *Daily Mail*.

Do not send me cod, hake, or fluke, but send me some middle cut salmon, a few lobsters and make up weight with oysters.

REPLY

Dear Sir,—Your P.O. to hand. It is a pity you could not send another tanner, and then you could have had the b * * * * trawler.

Yours, &c.,

Loose bolts don't cause nearly as many wrecks as tight nuts.—From the "*B.E.N. Monthly Bulletin*."

HOWLER

(With apologies to Lord Ashfield)
Plato was the god of the underground.—From "*600*" (Geo. Cohen Sons & Co. Ltd.).

Remote country stations seem to delight in the most unsuitable and inappropriate posters. "In one or two village railway stations," writes a correspondent, "I have seen large, highly-coloured posters imploring the local folk to spend their next holiday in Venice or Cannes. Or again in other instances the miniature waiting-room is completely over-shadowed by a poster advertising the latest pleasure cruises to the Mediterranean and so on. A map of London's Underground railways seems to find a place at many a tiny station miles from the city. It must be completely unintelligible to the country people who use the stations almost daily."

We have received from Mr. John L. Crosthwaite, Locomotive Superintendent of the Belfast & County Down Railway, the following cutting from the *Dublin Evening Mail*:—

RAILWAY COLLISIONS

Sir,—The number of people killed and injured in railroad collisions is appalling, and especially regrettable when apparently nothing has ever been done to remove the real cause of same, and which, when one considers the nature of practically every one of these mishaps, is undoubtedly due to lack of a proper watch being kept on the line ahead. I would, therefore, suggest that the surest way to remedy the matter would be to have a look-out cabin fitted on the front of each engine, where the man on duty would have nothing to do but to watch out for obstructions and damaged track, for which purpose he could have a powerful telescope. Furthermore, all engines should be equipped with powerful headlights capable of lighting up the track for

several hundred yards, and the rear of all rolling stock should be fitted with red reflectors. Special fog lights should also be carried during a fog. No train should proceed at a speed greater than that at which it can be stopped within that length of line which can be seen to be clear.—Yours faithfully,

Samuel C. Watson,
Rocksavage, Foxrock,
Co. Dublin.

BY GUM!

Dorking station-master went to Deepdene (the next station) to-day to collect coins from the automatic machines. "Hello! where's the chewing-gum machine?" he asked. Then it was found that the machine had been stolen during the night.—From the "*Evening News*."

"CLOCK STOPPED FOR EIGHTEEN MONTHS"

When an application for a licence for the carriage of goods by road was made by a Rock Ferry contractor to the North-Western Traffic Commissioners at Chester recently, it was alleged by a representative of the applicant that a consignment of meal by rail had taken a month to go from Birkenhead to Bishop's Castle, Shropshire.

Mr. G. H. P. Beames, representing the main line railway companies, said that the Bishop's Castle Railway was not connected with these companies. According to the *Liverpool Post*, he suggested that it was "rather antiquated"; that a signal-post had been used as a pole for a wireless aerial and that a clock at one of the stations had remained at a quarter to three for eighteen months.

The Commissioner.—"Whose child is this?"

Mr. Beames.—"It is certainly not a child of ours."

The Commissioner adjourned his decision in respect of the application, and said he hoped to inspect the Bishop's Castle

railway now that he had to deal with the goods side of traffic control. No representative of the Bishop's Castle Railway was present.

* * *

An Indian railway officer writes:—"Some years ago in India I had two labourers (we called them 'coolies') working at a roadside station where they were employed looking after the train lighting cells on a branch line train. They had only about two hours' work a day and so they were instructed to assist a gang employed in pumping water by means of a hand pump from a small well. This they refused to do and so they were discharged. The appeal below, obviously written by the bazaar letter-writer—and a poor one at that—was the result:—

Sir,

I beg to state that and an appeal to your honourable grace please excuse me in this time it is my first chance and favour me in these hard time my children will died. A servant is a faultier in every time and Bible shows a man can get forgiven so many times as seven multiply by 70=490. I hope that you will be kind enough and grant me my peal request and you will consider my case as fatherly eyes. And I have no source except your feet. And my pain will remove by your kind pen. We and our children will pray for your long life and duty bound.

Yours obediently,
Servant,

Sd/—Pertab Bali.
Electric Coolie.
Sd/—Bahadur.



Station name board, Padang Besar (junction of F.M.S. and Royal Siamese State Railways), giving the station name in English, Siamese, Tamil, Malay, Hindustani, and Chinese characters

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

Competition between Indian Railways—A year's traffic on the Mogyana Railway—Details of the proposed reorganisation in Spain—Egyptian railcar orders—French railway improvements for unemployment relief

INDIA

Commercial Research on Railways

At a time when economic planning is the order of the day, Mr. Pope and his Committee have done well to draw public attention in India to the comprehensive research organisation recently inaugurated under the Chief Commercial Manager of the L.M.S.R. The idea underlying this unit of organisation is to provide a means of carrying out detailed investigatory work and of developing new ideas—work for which the staff entrusted with daily routine would scarcely find time. This branch will provide the commercial manager with data upon which he can base his policy. The institution of such units of research on Indian railway administrations will be a move in the proper direction at the present moment, when investigation into economic questions is being instituted by the Central and Provincial Governments.

Inter-Railway Competition

Much competition in rates of transport exists on different railways leading to a common market or serving a common area of production but leading into competitive markets. Competition of this nature is one of the reasons militating against the increase of transport charges, even when such increase is likely to fetch additional revenue to the railway coffers without causing hardship on trade and industry. As the major railways are mostly State owned, the rate-cutting results in considerable loss to the State. The Pope Committee suggest that a co-operative examination of competitive rates may indicate possibilities of increasing rates for export traffic and offering reductions for the development of Indian industries. Such examination will, no doubt, be useful; but it has to be borne in mind that world trade is but slowly emerging from acute depression, and in matters affecting world trade and prices the greatest caution is necessary. Nevertheless, there are other directions to which the railways may increase revenues. The very substantial rebate in railway charges granted for the transport by rail of "export" coal is applicable to shipments of coal to Indian ports, to which the railways provide an alternative route. Indian ports are included in the category of exports because Indian coal carried to these ports by rail at normal rates has

been unable to compete with South African coal. For some years past, however, South African coal has practically been ousted from the Indian markets, and it might now be possible to exclude South African coal from India by negotiation. Coal traffic to Indian ports might then be diverted to the rail route and the "export" rebate now granted for coal shipments to Indian ports applied for a general reduction of rates for long-distance coal traffic. Such action would benefit both the railways and the coal industry.

Rolling Stock Expenditure for 1935-36

The Standing Finance Committee for Railways met at Simla on June 14 and 15. The agenda included the consideration of the rolling stock programme for 1935-36. The memorandum on the subject, prepared by the Railway Board in consultation with the various railway administrations, provides for a total expenditure for additions and renewals of Rs. 276 lakhs, excluding expenditure on general service wagons. The question of general service wagons is still under consideration and proposals on this item will be put before the committee at a subsequent meeting. The programme as now submitted was approved by the Committee. Statistics of engine usage were placed before the Committee to show that the engine mileage per day per engine on line was 60 for broad gauge railways in India. This figure was stated to compare favourably with the mileage in most foreign countries.

Stolen Railway Journeys

Reference has often been made in these columns to the very heavy loss in revenue sustained by the railways on account of passengers travelling without tickets. The system of ticket checking on trains has frequently been revised with a view to suppress fraudulent travel but the evil practice seems to continue. It is reported that for the year ended December 31, 1933, the number of passengers detected travelling without tickets on the B.B. & C.I. Railway is somewhat less than in the previous year so far as people other than mendicants are concerned. There is, however, a great increase in the number of mendicants turned out of trains. Mr. Pope and his committee reviewed the various steps taken by railway administration to counter the evil and are convinced that all reason-

able avenues have been explored with definitely unsuccessful results. They, therefore, consider that as the loss of railway revenue is so serious and the cost of attempted prevention so high, the whole question should be examined afresh with a view to the law being so altered as to make travelling without tickets a penal offence. Such amendment of the Indian Railway Act should be made without delay, irrespective of any other alterations that may be under contemplation.

BRAZIL

Mogyana Railway, 1933

At the annual general meeting, the following figures, relating to the financial year ended December 31, 1933, were announced, as compared with the previous year's working:

	1932 (Contos)	1933 (Contos)
Gross receipts ...	44,306	52,000
Expenditure ...	33,604	34,715
Net receipts ...	10,702	17,285

In spite, however, of the noteworthy improvement in net receipts, representing an increase of over 61 per cent., it was not found possible to make any distribution to the shareholders, mainly on account of sinking fund and interest payments on foreign loans, which absorbed no less than 14,559 contos, or 5,764 contos more than the year before, the lower value of the milreis for conversion into sterling being responsible for this. After meeting all obligations, the final balance became reduced to 162 contos, which was carried forward to the current year. With the exception of passengers and livestock receipts, which showed reductions of 9.8 and 16.2 per cent. respectively, increases were registered under every heading, and more particularly in coffee and other merchandise, to the extent of 1,558 and 2,324 contos, or 9.2 and 15.2 per cent. respectively; a special State of São Paulo levy of 10 per cent. on all freights, known as the "Taxa adicional Paulista," produced an increased of 3,569 contos.

As regards traffic statistics, the coffee tonnage transported amounted to 373,313 tons, compared with 365,982, the corresponding figures for other merchandise being 1,012,094 tons, as against 803,952, increases of 7,331 and 208,142 tons respectively. To the total of 12,653,970 bags of coffee entering the port of Santos during 1933, the Mogyana zone contributed 3,742,841 (an increase of 1,117,843 over 1932, when the revolutionary movement interfered with traffic), or 29.57 per cent. Passenger journeys totalled 1,931,980, an actual increase of 92,744, although receipts fell off slightly, as previously mentioned; parcels and luggage tonnage amounted to 43,632, an increase of 3,595 tons, and livestock transport totalled 207,134 head, a reduction of 132,938.

Due to slight modifications effected during the past year, the total length of the system at December 31 stood at 1,960.5 km., of which 1,876 are metre gauge, and 84.5 are 60 cm. Out of this total, 1,073.3 km. are operated under a São Paulo State concession, 873.5 under a Federal concession, and 13.7 under a Minas Geraes State concession. The rolling stock position at the end of 1933 was as follows:

	Metre gauge	60-cm. gauge
Locomotives*	197	10
Passenger coaches (including baggage, and postal vans, and fitted vehicles for parcels and poultry traffic)	300	19
Goods wagons	2,654	96
Cattle wagons	227	4

* Including five Beyer-Garratt 4-6-6-4's and eight Baldwin 2-6-6-2 articulated locomotives.

SPAIN

The Proposed Reorganisation

As was promised recently in the law authorising the 15 per cent. increase in tariffs, the Minister of Public Works has presented a Bill proposing a complete reorganisation of the railways in Spain. The Bill, which is published in the *Madrid Gazette* of June 23, is based on the total annulment of the Railway Statute of 1924. In general terms, the scheme outlined in the Bill is that all railway concessions shall be rescinded, the basis of the calculation of the compensation to the companies being the potential net earnings of the lines in the years remaining to the concessions, based on the net earnings of the previous 10 years. The financial charges are to be dealt with exclusively by the companies themselves. Once this general rescission of concessions has been effected, the State will divide the national system into three groups, to be known as the Northern, Southern, and Western. The boundaries of the groups can be followed by reference to the map published in these columns of the issue of June 8 last. They radiate from Madrid (1) northwards, immediately to the east of the Norte main line to Villalba, thence via Segovia and Valladolid to Venta de Banos (Palencia), and then northwards via Leon and Oviedo to Gijon, keeping to the east of the railways followed throughout, so that they and all lines west thereof fall into the Western Group. To the east of this boundary is the Northern Group, which extends to boundary (2), from Madrid to Zaragoza (Saragossa) and onwards to Tarragona, keeping to the south of the railways, followed so that they fall into the Northern Group. South of this second boundary is the Southern Group, which extends to boundary (3), running from Madrid through Ciudad Real and Almorcho to Cordoba and onwards to Seville, Jerez and Cadiz, keeping to the east or south of the railways followed, so that the existing M.Z.A. line to Seville is in the Southern

Group as far as Cordoba and thereafter in the Western Group. It will be noticed that all connections with France fall in the Northern Group and all with Portugal in the Western Group.

State or Private Working

The State may work the newly formed groups, but provision is made for contracting out the working to private companies, on the conditions and in the form laid down in the project. The contracts for working will be for 10 years, with possibility of extension for a maximum of ten years more. Local committees will represent the State in the working of the groups, under a central committee formed with representatives of the State, employees, companies and users. Provision is also made for co-ordination of road and rail transport. Road services running parallel to existing railways are to be accorded equality of taxation with the railways. In the event of competition which is considered to be prejudicial to the public interest, one or other of the services may be suppressed. The railways will have preference in the concessions of new road services.

The presentation of this project has given rise to considerable discussion. It remains to be seen the fate that awaits it when it finally goes to the Cortes, and there is no doubt that it will meet with considerable opposition, especially from the companies, who complain that they should at least have been consulted in the preparation of the project.

EGYPT

Railcar and Bus Chassis Orders

Large orders for rolling stock have just been issued by the Egyptian State Railways Administration. The total value, amounting to approximately £160,000, is distributed between steam and internal-combustion engined railcars (£140,000) and bus chassis (£20,000), and the orders have been divided as follows: Ten steam railcars with the Sentinel Waggon Works Limited; ten diesel-mechanical railcars with Ganz & Company; twenty petrol-engined bus chassis with John I. Thornycroft & Co. Ltd.; and ten petrol-engined bus chassis with Leyland Motors Limited. (Further reference to these orders will be found in our Contracts and Tenders section, and concerning the diesel railcar orders in our *Diesel Railway Traction Supplement* this week.—Ed., R.G.)

A probable reason for the placing of the order for diesel railcars with the firm of Ganz & Company of Budapest is the fact that payment for purchases in Hungary is made to the Egyptian Ministry of Finance, where it is deducted from the amount due to the Egyptian Government for the cotton

sales of a year or two ago. This seems to be the only way in which Egypt can obtain compensation for these sales in view of the ban on the export of money from Hungary. The order for the ten Sentinel steam railcars is a gratifying tribute to the experience of the Egyptian railways—not only those of the State but of the Egyptian Delta Light Railways Company—where steam railcars and Sentinel locomotives have been operating for a number of years.

FRANCE

Public Finance for Railway Improvements

A scheme of public works to be undertaken for unemployment relief was included in the financial measures recently passed by the French Parliament. It provides a sum of 2,725 million francs (about £34,000,000 at 80 fr. to the £) for the railways. The plans include the electrification of 800 km. (500 miles) of line, the construction of steel coaches, and widenings of the P.L.M. line from Paris to Lyons, as well as the extension of Paris Metro lines into the suburbs.

Already the Conseil d'Etat has approved a plan for the abolition of level crossings in the Greater Paris area and for improvements in Paris railway stations and approaches. The Seine department and the City of Paris will be authorised to borrow respectively 28,000,000 and 480,000,000 francs at an interest rate not exceeding 6.80 per cent. Out of the proceeds, grants will be made to the State Railways. In addition, the City of Paris will be authorised to make the State Railways a grant of 50,000,000 francs. Apparently, although this is not stated in the preliminary announcement, the plans include the reconstruction of the Montparnasse station and its approaches as proposed by M. Raoul Dautry, General Manager of the State Railways. His proposal, which has been under consideration for some years, is to make Montparnasse the principal terminus for the long-distance traffic of the State system and to reserve the St. Lazare terminus mainly for the inner and outer suburban traffic.*

New Railwaymen's Sanatorium

M. Flandin, Minister of Public Works, recently laid the foundation stone of a sanatorium for railwaymen at Champrosay, in the forest of Senart, near Paris. The new sanatorium is to replace an existing temporary institution, and is intended for men suffering from tuberculosis and other ailments. M. Jourdain, Sous-Directeur of the P.L.M. Company, and representatives of other lines and of the railwaymen were among those present at the ceremony.

* These proposals were described in THE RAILWAY GAZETTE of July 25, 1930 (p. 119).

SUCCESSFUL P.L.M. REBUILD

Alterations to 4-6-2 compound express locomotive of the Paris, Lyons & Mediterranean Railway have resulted in remarkable performance, as demonstrated by the test results cited

IN pursuit of the policy of raising speeds by increasing the power and radius of action of locomotives, the P.L.M. Company has decided, as a preliminary measure, and no doubt influenced by the success of the Paris-Orleans Railway rebuilds, upon the progressive modification of old locomotives rather than the construction of new machines. Apart from the possible economic merits of this plan, it has the important technical advantage of enabling the efficacy of alterations to be determined with certainty by comparison of performances before and after modification. Experience thus gained will provide a useful basis for the eventual design of new locomotives. From this standpoint, special interest attaches to the improved performance of the rebuilt Pacific locomotive 231-F-141, one of the Series 231-D built in 1923 and recently modified by increasing the boiler pressure from 16 to 20 kg. per sq. cm. (228 to 284 lb. per sq. in.), and by fitting a double exhaust, cylinders with larger steam passages, a superheater with separate inlet and outlet headers, and a feed water heater of the Dabeg type. The reconstruction of the locomotive was effected in the company's shops at Oullins, and the success attending the alterations may be judged from the trial data given later, which show that a train of 423 tons can be hauled from Paris to Lyons (511 km. or 317½ miles) at a journey speed of 100 km. (62.14 miles) per hr. or higher, with a substantial reduction in specific consumption and the maintenance of perfect firing conditions.

The leading dimensions of the rebuilt locomotive are:—

Cylinders—			
Diameter, high-pressure	400 mm. (15½ in.).		
" low-pressure	650 " (25½ ").		
Stroke, high-pressure	650 " (25½ ").		
" low-pressure	650 " (25½ ").		
Coupled wheels, diameter	2,000 mm. (6 ft. 6½ in.).		
Bogie wheels, diameter	1,000 " (3 " 3½ ").		
Bissel wheels, diameter	1,360 " (4 " 5½ ").		
Boiler working pressure	20 kg. per sq. cm. (284 lb. per sq. in.).		
Boiler heating surface—			
Tubes and flues	188.14 sq. m. (2,024 sq. ft.).		
Firebox	15.68 " (169 ").		
	203.82 " (2,193 ").		
Superheater	44.58 " (480 ").		
Total	248.40 " (2,673 ").		
Grate area	4.25 sq. m. (45½ sq. ft.).		
Wheelbase, rigid	4,200 mm. (13 ft. 9½ in.).		
" total engine	11,230 mm. (36 ft. 10 in.).		
Weight of engine in working order ..	100.150 metric tons (98½ tons).		
Adhesion weight	57 metric tons (56 tons).		
Tractive effort at starting	10,087 kg. (22,242 lb.).		

There are no new features to be noted in the frames, wheels and springs, but the steaming capacity and power developed have been greatly increased. The general arrangement of the rebuilt locomotive is shown in the accompanying photograph and drawing.

Boiler Alterations

The changes effected in the boiler are simply those necessitated by the increase in working pressure, the improvement of draught and the new arrangement of tubes.

The firebox is the same as in the 228-lb. locomotives except that the diameter of the crown stays has been increased from 19.5 to 24 mm. (approx. ¾ to 1½ in.) and, in some instances, 26 mm. (nearly 1½ in.). The thickness of the barrel plates has been increased from 19 to 23 mm. (¾ to ¾ in.); the mounting of the smokebox tube plate has been reinforced; and the cross section of flow through the superheater flues has been increased by the following changes:—

	Original (228 lb./sq. in.)	Rebuilt (284 lb./sq. in.)
Tubes, number and diameter	128 of 51 × 55 mm. (2.007 × 2.165 in.).	124 of 51 × 55 mm. (2.007 × 2.165 in.).
Flues, number and diameter	26 of 135 × 143 mm. (5.315 × 5.630 in.).	26 of 141 × 150 mm. (5.551 × 5.905 in.).
Superheater	26 elements 28 × 35 mm. (1.102 × 1.378 in.); single header	26 elements 28 × 35 mm. (1.102 × 1.378 in.); header with separate chambers.
Cross section of gas passage:		
In tubes = A	0.2615 sq. m. (2.81 sq. ft.).	0.2533 sq. m. (2.72 sq. ft.).
In flues = B	0.2721 sq. m. (2.93 sq. ft.).	0.3059 sq. m. (3.29 sq. ft.).
Ratio B/A	1.04	1.21

The superheater surface in the converted locomotive is equal to 21.9 per cent. of the evaporative heating surface, and the improved draught results not only in a greater flow of gases but also in more effective heat transference in the tubes and flue.

Superheater and Feed Water Heater

The superheater, built by the Compagnie des Surchauffeurs, has headers of the separate-chamber type. The elements are attached to the headers by forged spherical joints, and the arrangement of the loops in the flues is such that the rear ends are as near as possible to the firebox tube plate, and superheating occurs in the zone of maximum temperature. Due to this arrangement, and to the avoidance of conduction of heat from the superheated to the saturated steam by the use of separate header chambers, from 15 to 20° C. (27 to 36° F.) higher temperature of superheat is obtained.

Feed water is taken from the tender by an ACFI pump and heater to a Dabeg economiser the 22 elements of which, of the same diameter as the superheater elements, are mounted in front of the superheater loops, thus recovering additional heat from the flue gases without appreciably increasing the resistance to their flow. The economiser receives water at 98-100° C. (208-212° F.) and raises it to 135-140° C. (275-284° F.).

Old and New Blast Pipes

The application of the double exhaust is one of the most important alterations in the locomotive. Invented by M. Parmantier, Ingénieur en Chef adjoint du Matériel, and developed by the P.L.M. Company, this device increases the rate of combustion on the grate and reduces the back-pressure. Compared with the variable trefoil blast pipe originally fitted, the new arrangement has two separate chimneys and two blast pipes with movable crosses, each giving four separate jets of variable section. A petticoat controls the rate of combustion on the grate.

Increased cross sections are available for the flow of exhaust steam and flue gases, the exhaust steam passages in the old and new arrangements being:—

	Single Trefoil Blast Pipe	P.L.M. Double Blast Pipe
Open ..	181 sq. cm. (28.05 sq. in.).	274 sq. cm. (42.47 sq. in.).
Closed ..	120 " (18.60 ")	181 " (28.05 ")

The double exhaust eliminates the eddies and sudden changes of cross section inevitable with the older arrangement. The back pressure is reduced by at least 50 per cent., and a better fire is maintained with less clinkering and reduced cost of grate maintenance.

Motion and Valve Gear

No attempt has been made to secure exact balance of power between the high and low pressure cylinders, an increase in the proportion of power developed by the outside cylinders being considered preferable to any risk of overloading the crank axle at the high speeds and outputs here concerned. The increase in boiler pressure, from 228 to 284 lb. per sq. in., allowed the diameter of the high-pressure cylinders to be reduced from 440 to 400 mm. (17 $\frac{1}{8}$ to 15 $\frac{3}{4}$ in.), but the low pressure cylinders are of 650 mm. (25 $\frac{3}{8}$ in.) diameter as before. The outside, high-pressure cylinders are mounted horizontally, 2,230 mm. (7 ft. to 3 $\frac{1}{2}$ in.) between centres; while the inside, low-pressure cylinders, set at an inclination of 4 deg. 9 sec., are 690 mm. (2 ft. 3 $\frac{1}{2}$ in.) between centres. The angle between the corresponding cranks of the high and low pressure cylinders is thus 175 deg. 59 min. 51 sec. The length of the connecting rods is 3,000 mm. (9 ft. 10 $\frac{1}{8}$ in.) for the high- and 1,675 mm. (5 ft. 5 $\frac{1}{8}$ in.) for the low-pressure cylinders.

Piston valves are employed, with coupled Walschaert valve gear of the company's usual type. This equipment offers the advantages of simplicity in construction and operation; also, the ratio between the high and low pressure cut-offs is fixed by the adjustment of the gear in the shops and is not left to the driver's discretion. The piston valves are of 240 mm. (9 $\frac{1}{2}$ in.) dia. \times 172 mm. (6 $\frac{3}{4}$ in.) maximum stroke for the high-pressure cylinders, and 360 mm. (14 $\frac{1}{8}$ in.) dia. \times 221.5 mm. (8 $\frac{3}{8}$ in.) maximum stroke for the low-pressure cylinders. The admission lap (inside) is 34 mm. (1 $\frac{1}{2}$ in.) for both cylinders; and the average maximum admission is 79.75 per cent. on the high-pressure and 87.45 per cent. on the low-pressure side. The capacity of the intermediate receiver is 382 litres (13.49 cu. ft.). Special attention has been paid to enlarging the area and improving the form of the steam passages, thus enabling maximum advantage to be derived from the increase in boiler pressure and the improvements in draught and back pressure.

Compressed air for braking is provided by a bi-compound pump of high capacity; and provision is made for the steam heating of trains.

Trial Results

Official trials of the rebuilt locomotive, first with a dynamometer car between Laroche and Les Laumes (102 km. or 63.4 miles), and then hauling a trailing load of 430 metric tons (423 tons) between Paris and Lyons, show clearly the extent of the improvements effected. Whereas the original 231-D type locomotive was able to develop only 1,600 metric h.p. (1,579 h.p.) sustained output at the drawbar, the rebuilt machine 231-F-141 can develop 2,200 metric h.p. (2,171 h.p.) continuously, with a lower consumption of coal and water per h.p.-hr. Also, the improved condition of the fire increases the radius of action of the locomotive.

Indicator cards taken at a running speed of 100 km.

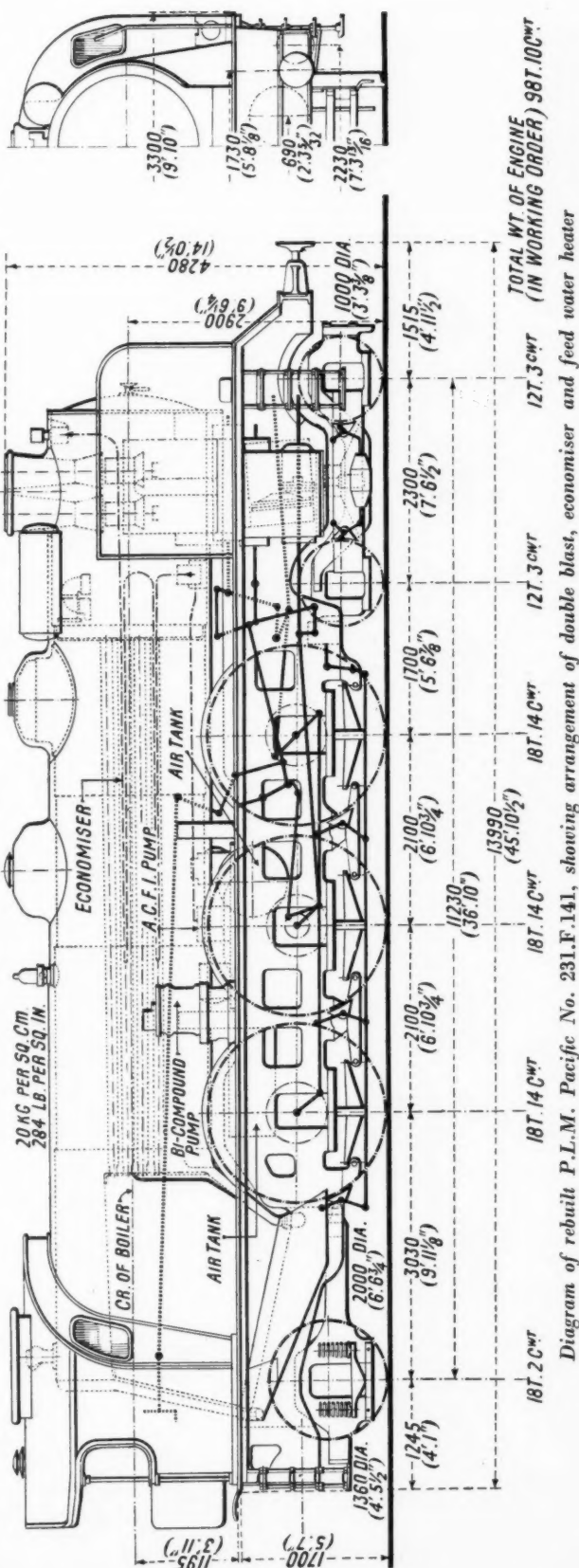


Diagram of rebuilt P.L.M. Pacific No. 231-F-141, showing arrangement of double blast, economiser and feed water heater

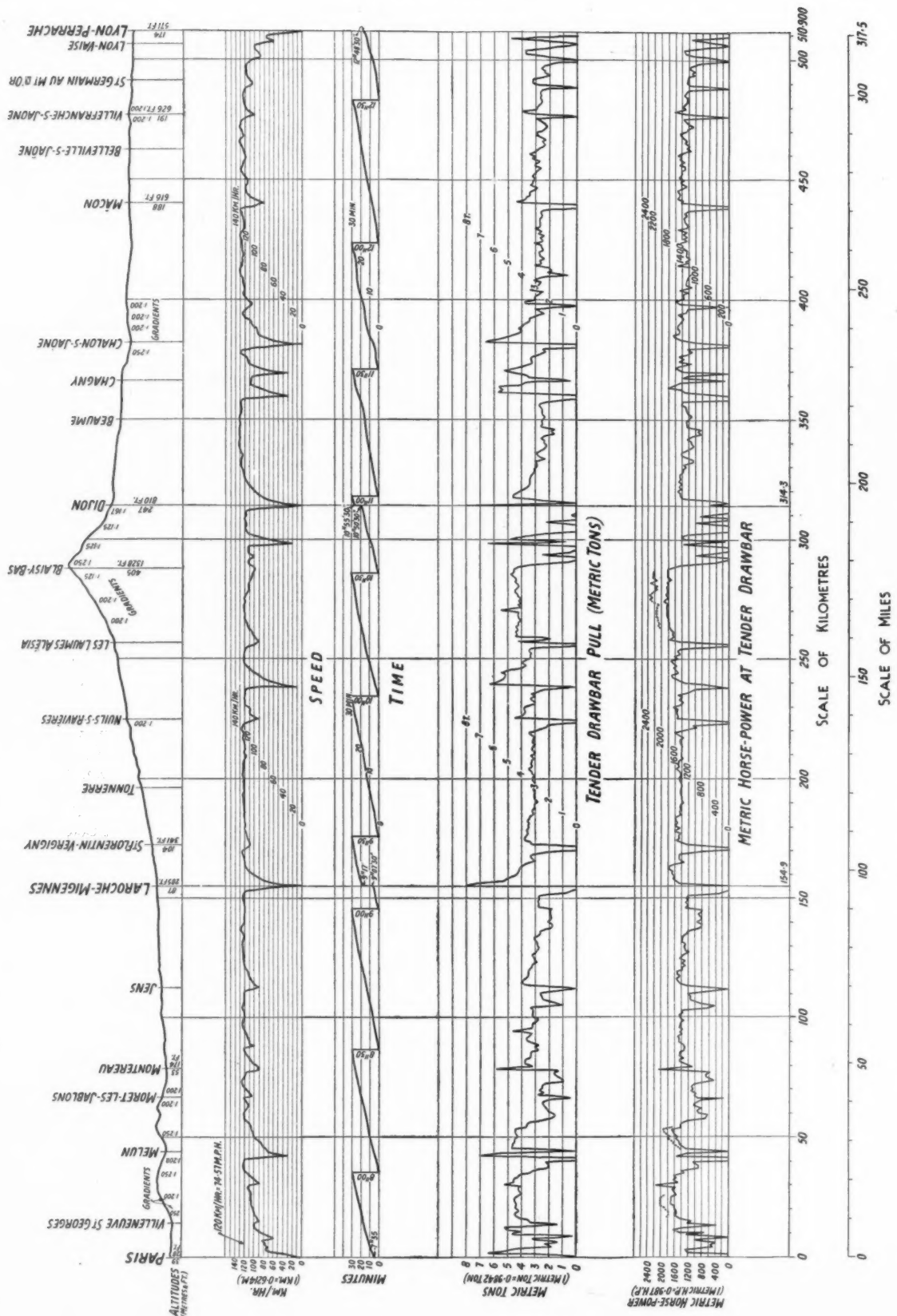


Diagram of test run of rebuilt Pacific locomotive No. 231.F.141 between Paris and Lyons, P.L.M. Railway

(62.14 miles) per hour, with 55 per cent. cut-off in the high-pressure and 69 per cent. in the low-pressure cylinders, show that the high-pressure cylinders develop 1,780 metric h.p. (1,757 h.p.), while the low-pressure cylinders develop 1,153 metric h.p. (1,138 h.p.) or practically 40 per cent. of the total. The back-pressure on the exhaust from the low-pressure cylinders is 0.33 kg. per sq. cm. (4.7 lb. per sq. in.). At 119 km. (74 miles) per hr., with 50 and 63 per cent. cut-off in the high- and low-pressure cylinders respectively, the low-pressure cylinders still develop 1,063 metric h.p. (1,049 h.p.), or within 8 per cent. of the figure mentioned above, thus demonstrating the adequacy of the steam passages.

During the official trials, the rebuilt locomotive hauled

(74.6 miles) an hour and sometimes reached 133 km. (82.6 miles) an hour. The total consumption of coal was between $7\frac{1}{2}$ and 8 tons, including 1 ton for preparation and raising steam, corresponding to from 46 to 50 lb. a mile (excluding preparation). The consumption of water was about 59 cu. m. (12,980 gallons) or an average of 41 gallons per mile. With a tender of 35 cu. m. (7,700 gallons), making it possible to avoid the stop at Laroche, and with a train of 330 metric tons (324 tons 15 cwt.) consisting of a restaurant car, five coaches and a luggage van, the rebuilt locomotive could complete the Paris-Lyons run in 4 hr. 58 min., at an average schedule speed of 102.6 km. (63.75 miles) per hour.

Taking the average running speed of the locomotive to



P.L.M. Pacific class locomotive of the 231-D series of 1923 as rebuilt with raised boiler pressure, double exhaust and other modifications for long-distance high-speed service

a train of 430 metric tons (423 tons), comprising a dynamometer car, seven coaches and one luggage van, from Paris to Lyons in 5 hr. 7 min., including stops of 3 min. at Laroche and 5 min. at Dijon for taking water (the run shown in the diagram opposite took 5 hr. 13½ min. including 9½ min. stop at Laroche). The average running speed was thus 102.5 km. (63.7 miles) an hour for the whole journey of 511 km. (317.5 miles). The equivalent horse-power on the level (at the tender drawbar), shown by the dotted lines in the diagram ranged from 2,000 to 2,500 metric h.p. (1,974 to 2,468 h.p.) on the Blaisy gradient; and on many occasions during the journey the speed exceeded 120 km.

be 100 km. (62.14 miles) an hour, its performance at this speed, with 55 per cent. high-pressure and 69 per cent. low-pressure cut-off, is: Indicated output 2,933 metric h.p. (2,895 h.p.); tender drawbar pull, on the level 6,471 kg. (14,268 lb.); tender drawbar horse-power, on the level 2,397 metric h.p. (2,366 h.p.).

Twenty-five locomotives are being rebuilt on generally similar lines to No. 231-F-141, but without new high-pressure boilers. These locomotives, which retain their working pressure of 16 kg per sq. cm. (228 lb. per sq. in.), are numbered as series 231-G, and have the double chimneys within a single casing.

Young's Modulus for Steel

Young's modulus of elasticity E or, as it may be defined, the ratio of the stress to the strain in a piece of steel up to the elastic limit, is an important quantity used by designers of all types of steel structures. It is generally assumed that E is a constant quantity for any given steel whatever the heat treatment applied, and it is also well known that the modulus of elasticity is approximately constant, within somewhat wider limits, for ordinary carbon steels of different compositions and for alloy steels of low alloy content. In spite of this, few highly accurate direct determinations of E have been made, and with a view to remedying this defect a series of experiments

were undertaken at the Research Department, Woolwich and at the National Physical Laboratory. A description of these experiments, together with the results obtained, were given in a paper by H. H. Abram, presented at the recent meetings of the Iron and Steel Institute. The results of these experiments show that pure iron in the annealed condition has a modulus of about 30.2×10^6 lb. per sq. in. and that with an increase in the carbon content this value diminishes to approximately 29.7×10^6 lb. per sq. in. In medium- and in high-carbon steels the value of the modulus is approximately constant, and heat treatment does not appear to affect the modulus.

NEW BUFFET CARS, GREAT WESTERN RAILWAY

Two cars of a special type were placed in service on July 9



With the introduction of the summer service on Monday last the G.W.R. placed in service the two special type buffet cars which we described and illustrated on pages 15 and 16 of last week's issue.

We are now able to supplement our description of these cars, which enable passengers to obtain a quick lunch or light refreshments, by three illustrations showing the interior of one of the cars in service.

Twelve stand-up rest seats are arranged along the counter at the centre, leaving spaces at each end for serving drinks. A stainless steel footrail extends the whole length of the counter, and a recess under the counter top, in front of the seats, makes provision for hats and hand bags.

The counter top is inlaid with marble green composition, with ebonised hardwood margins, and the whole is finished

with a non-stain surface. The counter front is divided into four longitudinal panels divided by stainless steel strips. The top two panels are painted duck-egg green, and the panel behind the footrail is covered with mottled dark brown rubber to form a kicking strip. The remaining panel between the kicking strip and the floor is covered in dark green Rexine.

The following firms have supplied special equipment :—
W. M. Still & Sons Ltd. (Water boiling and coffee making apparatus).

Fletcher, Russell & Co. Ltd. (Gas griller in pantry).

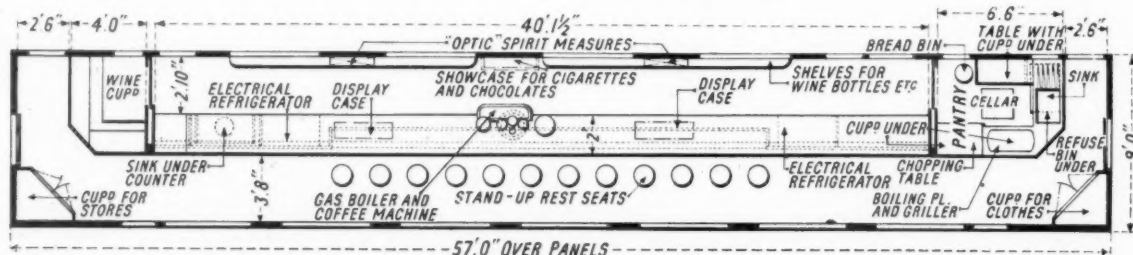
Frigidaire Automatic Refrigerators (Refrigerators).

Gaskell & Chambers (London) Ltd. (Counter and fittings).

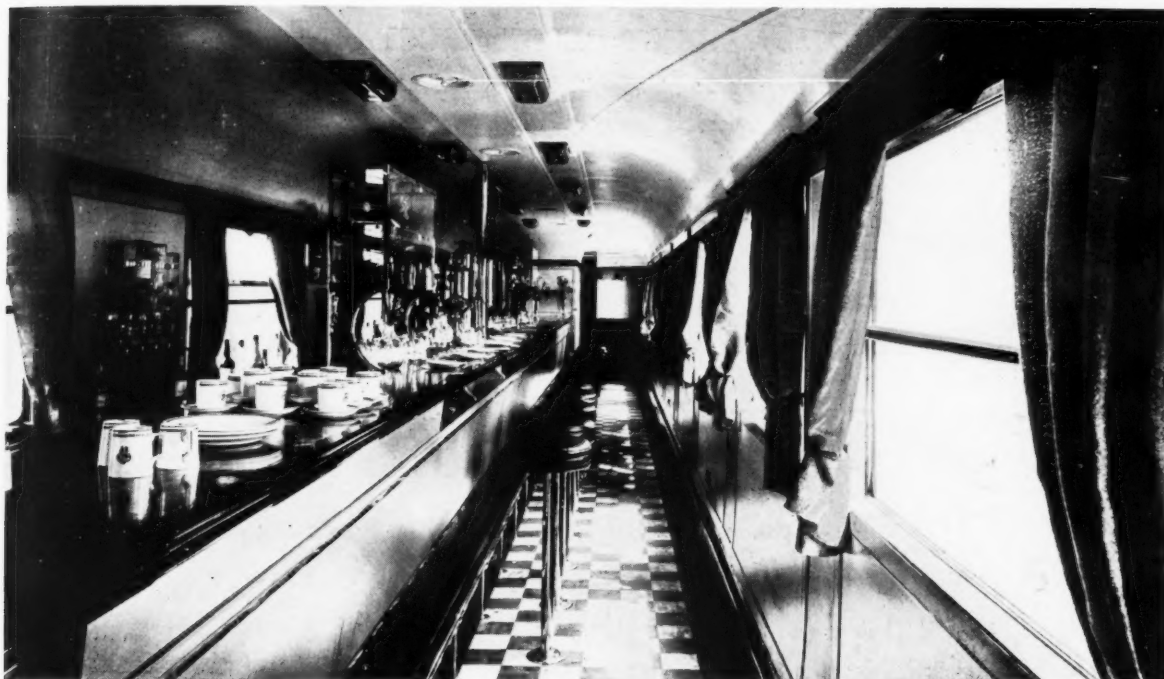
Thermotank Limited (Air filter and temperature regulating unit for ventilation).

Dunlop Rubber Co. Ltd. (Flooring).

Rexine Limited (Rexine).



Floor plan of new G.W.R. buffet car



Public side of counter in new G.W.R. buffet car showing stand-up rest seats, footrail, and hat recess



Service side of counter with electrically-operated refrigerators and other modern food storage facilities

L.M.S. VIADUCT RECONSTRUCTION

Three important main line viaducts between Derby and Ambergate are being rebuilt under traffic. A special type of air lock with a horizontal shaft or gallery is being used for sinking the new cylinders under the old girders

BETWEEN Derby and Ambergate the Midland main line of the London Midland & Scottish Railway to the north and to Manchester traverses the Derwent valley and, due to the devious course of the river, the line crosses it in several places on viaducts of varying lengths, their angle of skew being about 45° . As these are not of sufficient strength to carry the heaviest types of locomotives, an order has recently been placed for three

constructed in 1878, superseding the original viaduct constructed in timber. The existing viaduct is composed of six rows of independent wrought iron deck plate girders, 4 ft. 3 in. deep, which support a timber floor, composed of cross timbers, 6 in. thick. The girders are supported over the river by seven rows of cast iron screw piles; one masonry pier, 4 ft. thick, constructed on an islet between the third and fourth spans from the Belper end;

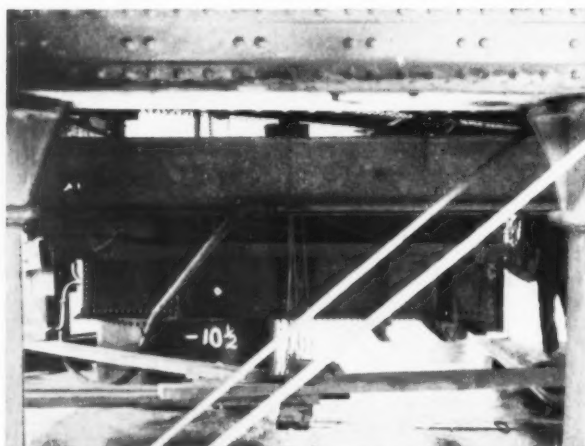


Fig. 1—Special air lock with horizontal shaft or gallery under the bridge girders

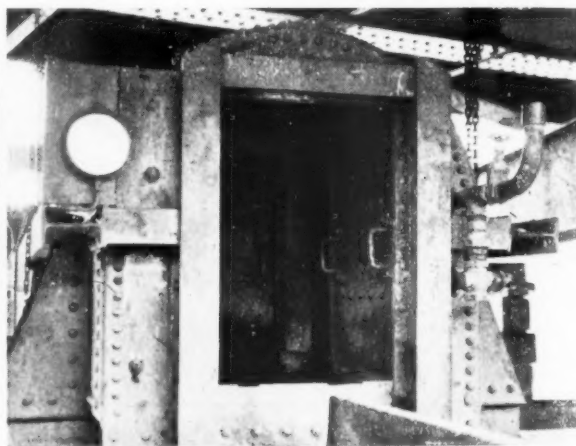


Fig. 2—Air lock entrance door at end of horizontal gallery

of the viaducts to be reconstructed, viz., Swainsley viaduct, No. 24, Belper Pool viaduct, No. 36, and Broadholme viaduct, No. 37.

The Old Viaducts

Swainsley viaduct, 220 ft. long, and situated one mile south of Belper station, consists of six spans, two spans of 25 ft. 6 in. each, over land at the north and south ends, and four spans of 42 ft., over the river Derwent. The viaduct dates from 1882, superseding a timber structure, built when the line was originally constructed in 1840. The existing viaduct is composed of five wrought iron, deck plate girders, 3 ft. deep, continuous over the six spans, which support a timber floor, composed of cross beams, 12 in. square, spaced at 4 ft. centres, on which a 4-in. plank floor is placed. The continuous wrought iron girders are supported over the river by three rows of cast iron screw piles, while at each edge of the river bank masonry piers are provided, 3 ft. 6 in. thick, and the abutments, as in the other two viaducts, are also constructed of masonry. Each row of screw piles contains five piles, braced together, each shaft being 2 ft. diameter, with bearing blade at the bottom 4 ft. in. diameter. The average length of these piles is about 30 ft., and they penetrate into the river bed to a depth of about 8 ft.; the girders are seated directly on the pile caps.

Belper Pool viaduct, No. 36, is the longest of the three, being 475 ft. in length and situated 40 chains north of Belper station. It consists of ten spans, nine over the river, varying from 46 to 50 ft. and one 33-ft. land span at the north end of the viaduct. The viaduct was con-

and another masonry pier of similar thickness at the edge of the river bank on the north side. Each row of piles is similar to those at Swainsley viaduct, but the average length of piles is about 20 ft., and they are driven into the river bed to a depth of about 6 ft. The girders are seated on a wrought iron sill girder, 1 ft. deep, which spans across the top of the piles.

Broadholme viaduct, No. 37, is 348 ft. long, situated 30 chains north of Belper Pool viaduct and consists of seven spans varying from 45 ft. to 52 ft. The viaduct was constructed in 1883, again superseding an earlier viaduct constructed in timber. The existing viaduct is composed of five rows of wrought iron deck girders, in two lengths, 4 ft. deep, being continuous over the three south spans, and again continuous over the remaining four spans. The floor is of timber, and is similar to that at Swainsley, except that it has a 6 in. plank floor. The continuous wrought iron girders are supported over the river on five rows of cast iron screw piles, and between the third and fourth span on a 5-ft. thick masonry pier. Here each row of screw piles contains five piles braced together, each shaft being 2 ft. 6 in. diameter with bearing blade at the bottom 5 ft. diameter. The average length of piles is about 26 ft., and they penetrate into the river bed about 12 ft. The deck girders are seated on a wrought iron sill girder, 3 ft. deep, which spans across the tops of the piles.

The Reconstruction

The viaducts are being reconstructed to one type which entails the provision of new supports sunk under the

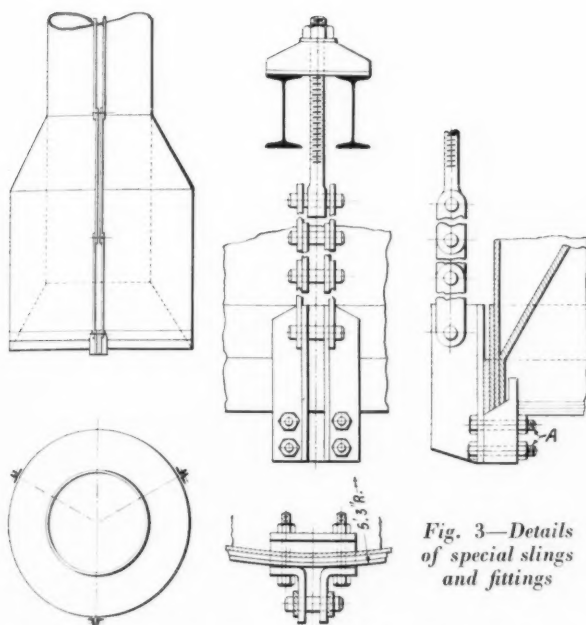


Fig. 3—Details
of special slings
and fittings

existing viaducts, between the rows of existing piles. The supports take the form of steel cylinders braced together in pairs. From the bottom of the foundation to bed level, the cylinders are 10 ft. 6 in. and 12 ft. in diameter for the shorter and longer spans respectively. At bed level a tapered strake is used to reduce the diameter to 6 ft. for the shorter and 7 ft. for the longer spans. The cylinders are being sunk to the required depth by the pneumatic process, a special form of air lock having to be used in view of the restricted head room between the top of the well and the under side of the existing girders. The special air lock horizontal gallery or shaft is illustrated in Figs. 1 and 2.

Each cylinder is slung from the temporary staging by means of three special slings—shown in Fig. 3 above—which enable them to be lowered into their correct positions. After the curb has grounded, the air lock is fitted and the special slings can be readily detached by knocking out bolts A, Fig. 3, from inside the curb. On reaching their final depth, the cylinders are filled with concrete, and granite caps, 2 ft. 6 in. thick, are provided upon which a sill girder, 3 ft. 6 in. deep, spans across each pair of cylinders to support the new superstructure. The latter is made up of four rows of independent main steel deck girders, spaced at about 5 ft. 9 in. centres, and each 5 ft. deep for Swainsley viaduct and 5 ft. 3 in. deep for Belper Pool and Broadholme viaducts. On the top of these is a floor composed of 8 in. \times 6 in. rolled beams about 29 ft. long, spaced at 2 ft. centres, encased in concrete and covered over with a layer of asphalt $\frac{3}{4}$ in. thick. This, in turn, is covered with a 1-in. layer of brindle brick quarry tiles, run with a mixture

of pitch and tar immediately under the ballast. The small span at the north end of Belper pool viaduct will be reconstructed of longitudinal compound beams in concrete similarly waterproofed and protected.

Fig. 4 shows work in progress on the girder changing during a recent occupation of the main line at Belper Pool viaduct. The parapets will be composed of angle standards and handrail tubing. It will be necessary to make alterations to the existing abutments and piers, the work entailing the provision of new bedstones at revised levels. The existing masonry piers are being examined by a diver to ascertain whether any repairs are required to their foundations due to scour of the river. The general contractors are Mitchell Bros., Sons & Co., Westminster, who have sublet 1,700 tons of steelwork in girders, &c., to the Butterley Co. Ltd. The steel cylinders are being fabricated by the Horsey Co. Ltd.

Work will be commenced at Swainsley Viaduct on completion of Broadholme and Belper Pool bridges, both of which are now in hand. Up to the time of writing no unforeseen difficulties have been met with either in the foundations or the superstructure.

The work is being carried out under the direction of Mr. W. K. Wallace, Chief Civil Engineer of the L.M.S., supervised by Mr. E. H. d'E. Darby, Divisional Engineer, and, until his untimely death, by the late Mr. R. T. McCallum, District Engineer (Derby North).

The reconstruction is being carried out without interference with weekday traffic, but on Sundays traffic is diverted as described in detail on page 829 of THE RAILWAY GAZETTE of May 11, leaving the line entirely in the hands of the engineers to enable the various erection operations to be carried out with a minimum of interference.

The work is now well in hand and Belper Pool and Broadholme viaducts are nearing completion, the substructure and girder-changing being finished. In the case of the latter only the painting remains to be done, and it is anticipated that the reconstruction at Belper Pool will be completed by the end of August. At Swainsley, the contractor's temporary bridge and staging are nearly completed, and work on the cylinders has been begun. It is expected that the cylinder foundations and abutment alterations will be completed in time for the erection of the steelwork to be begun at the end of August and that the reconstruction will be completed by the end of November.



Fig. 4—New main girders being placed in position at Belper Pool viaduct. The old and new piers may be seen

HIGH SPEED RAILCAR SERVICES ON THE P.L.M.

Three Bugatti streamlined railcars have been delivered for service on the Paris, Lyons & Mediterranean Railway for high speed main line service

IN the summer timetables of the Paris, Lyons & Mediterranean Railway there appear two very fast schedules each way between Paris and Lyons, and Paris, Vichy and Clermont-Ferrand, with the note that these will be brought into operation at a date to be announced. The Paris-Vichy section started on July 9. The services are to be worked by streamlined Bugatti cars and on the Paris-Vichy section of the Paris-Clermont service, on the up journey, the 226½ m. between Vichy and the French capital are booked to be covered in 223 min., with four intermediate stops each of a minute in duration. The actual running time of 219 min. therefore demands an average speed of 62.1 m.p.h. The down service is allowed 234 min. for the corresponding journey, with the same number of stops. These timings make an interesting comparison with those of the down Cornish Riviera Express, allowed 244 min. from Paddington to Plymouth (225½ m.) with one intermediate stop of 3 min. at Exeter. The throughout timings of the railcars between Paris and Clermont-Ferrand (261 m.) are 275 min. and 260 min. for the down and up trips respectively. There is a three minutes' stand at Vichy and Clermont, in each direction. The service will run on weekdays only and be limited to first class passengers.

Actually nine Bugatti railcars have been ordered by the P.L.M. Six of them are similar to the one-vehicle, two-bogie type that has been operating on the French State Railways for the past year between Paris and Deauville,

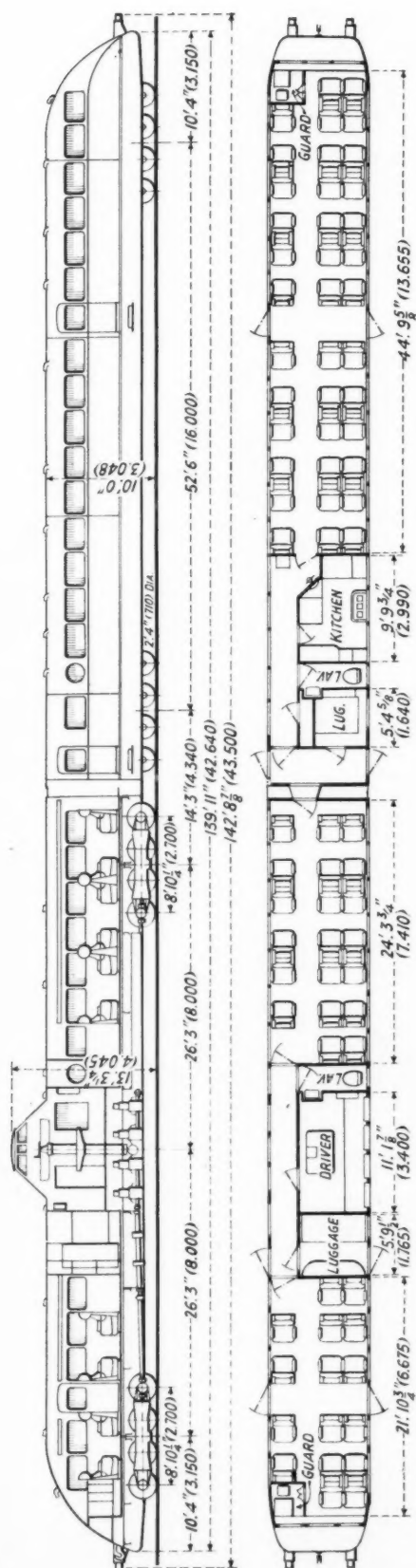
and between Paris, Rouen and Havre; these light Bugatti railcars will, however, have only two motors of 200 h.p. each. The other three are termed *couplages*, indicating that they consist of two vehicles coupled together in order to get increased accommodation for passengers, and it is these which are being used for the services mentioned above. The seating in the P.L.M. *couplages* is not of the Bugatti reversible type but is similar to that in first class Pullman cars, and the upholstery is in brown velvet. There are 36 seats in the motor car and 38 in the trailer, and they are arranged in pairs on the left hand side with single ones on the other side. They are arranged so that half face in each direction. Folding tables can be fitted in front of the passengers who require them. There is a small buffet-kitchen in the trailer-car, lavatories in each car and ample accommodation for luggage. The large windows enable a wide view to be obtained in almost any direction.

As regards the mechanical arrangements, they are generally similar to those described in THE RAILWAY GAZETTE of September 29, 1933. The engine compartment is arranged in the middle of the leading carriage and it contains four 8-cylinder Royal Bugatti engines of 200 h.p. each, placed side by side transversely across the car, with two of the engines driving, through hydraulic clutches and reversing gearboxes, the forward bogie, while the other two are connected in similar manner to the other bogie. The fuel is a mixture of 55 per cent. petrol, 30 per cent.

HIGH SPEED RAILCAR SERVICES ON THE P.L.M.



In this view the first of the new Bugatti streamlined double railcars, built for the fast service, between Paris and Clermont, Ferrand and Lyons, is seen in Vichy station. It brings out the streamlining of the body at the front and sides, shows the taller conning-tower than on the earlier models, the new position of the radiators forming the outer wall of the engine cabin, and the little steps which serve to bridge the gap between the coach and the platform. All the windows are fixed and ventilation is effected by the devices on the roofs of the cars. Note too how the skirting is carried down almost to the ground to prevent the creation of air eddies round the wheels.



General arrangement drawings showing the location of the seating, the engine compartments, the engine room, with the driver's cabin above it, the kitchen, the lavatories and the observation posts for the guard at each end of the vehicle

benzole and 15 per cent. alcohol, carried in four double-skin, sheet-metal tanks, each of 285 litres capacity.

The bogies are arranged similarly to those described in THE RAILWAY GAZETTE of May 26, 1933, that is to say there is the same scheme of mounting the axles so that the movement of any one of them has its amplitude reduced to one fourth by the time it reaches the pivot which connects the bogie to the vehicle itself. That, of course, refers to movement in an up or down direction but lateral movement is designed to be diminished in much the same way by the utilisation of the four points of the frame of the bogie as a balance lever to secure a differential movement between the axles. The result is that very sharp curves can be traversed at really high speeds without any tendency to derailment.

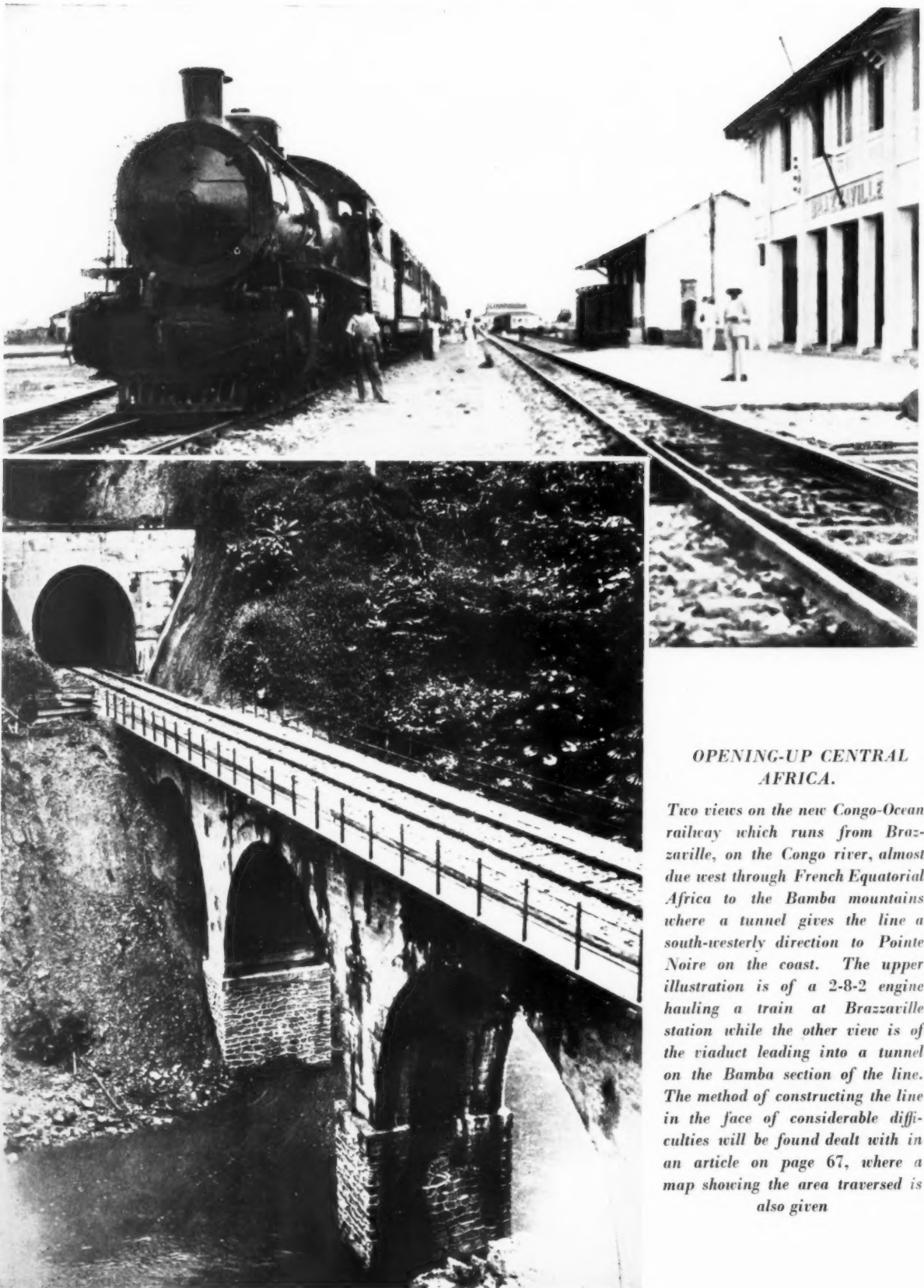
There is another ingenious example of balancing in the arrangement of the cables for operating the internal expanding brakes, of which there is one on each wheel. There is a balancing lever between each pair of cables, another balancing-lever between each pair of balancing levers and another balancing lever divides the effort between the two just indicated. Thus the effort is evenly distributed over all the brakes of a bogie and actually there is another balancing lever above the last ones for each bogie, so securing complete compensation.

In the coupled vehicles for the P.L.M. the leading section carries the motors and is only streamlined in front and at the sides. The trailer is similar in outward appearance except, of course, that the streamlining is at the after end. The two are coupled together by a ball-type universal joint while one side of the joint is mounted on a slide, to provide for lateral movement, controlled by a leaf spring on each side of it. The arrangement of the bogies on the trailer is similar to that of the driven car except that all the axles are simply carriers and take no part in the propulsion. There is one difference between the earlier types of Bugatti railcars and that is to be seen in the four radiators which form the wall on the near side of the engine room and extend from the floor line to the top line of the windows. All the windows are fixed so that there may be no eddies formed to have a slowing effect on the train, for the form of the train has been determined by air-tunnel experiments designed to secure a profile which shall offer the least resistance to passage through the air as well as being affected to the minimum extent by passing trains and when traversing tunnels.

The bodywork is of sheet steel on wooden framing and rubber is used to a great extent. The spigots which connect the body to the chassis are mounted in rubber pads and rubber is used under the tyres of the wheels and rubber bushes and washers round the bolts connecting the hubs to the other parts of the wheels. It will be noticed from the photograph that the conning-tower is of slightly different shape to the first design, being somewhat taller and with sides at an angle which is steeper than before.

Through Engine Working on Paris-Orleans-Midi Railways

Since the working agreement came into force on January 1 of this year between the Paris-Orleans and Midi Railways of France, much through working of locomotives and rolling stock has been found practicable, with considerable operating economy. For example the highly efficient and powerful 4-8-0 P.O. express locomotives of the 4700 type (described in THE RAILWAY GAZETTE of July 14, 1933, page 48), rebuilt from early Pacifics, now work right through in two stages from Vierzon (where they take over the trains from electric locomotives) to Narbonne, 226 miles, with only one change at Brive, 186 miles from Vierzon.



OPENING-UP CENTRAL AFRICA.

Two views on the new Congo-Ocean railway which runs from Brazzaville, on the Congo river, almost due west through French Equatorial Africa to the Bamba mountains where a tunnel gives the line a south-westerly direction to Pointe Noire on the coast. The upper illustration is of a 2-8-2 engine hauling a train at Brazzaville station while the other view is of the viaduct leading into a tunnel on the Bamba section of the line. The method of constructing the line in the face of considerable difficulties will be found dealt with in an article on page 67, where a map showing the area traversed is also given

RAILWAY NEWS SECTION

PERSONAL

The Lord Hirst of Wotton and the Lord Wakehurst of Ardingly were, in the usual manner, introduced and took their seats in the House of Lords on July 11.

L.M.S.R. APPOINTMENTS

The following L.M.S.R. appointments have been approved by the directors:—

Chief Commercial & Chief Operating Managers' Departments

Mr. J. Davies, Assistant to District Goods and Passenger Manager, Bristol, to be Stationmaster, Nottingham.

Mr. F. Brooks, Goods Agent, Derby (St. Marys), to be Joint Goods Agent, Derby (St. Marys) (the L.M.S.R. & L.N.E.R.).

Mr. G. E. Howlett, Stationmaster and Goods Agent, St. Albans (also in charge of Napsbury), to be Stationmaster and Goods Agent, St. Albans (L.M.S.R. & L.N.E.R.).

Chief Operating Manager's Department

Mr. J. R. Darbyshire, Head Office Inspector, Euston, to be Outdoor Assistant to Divisional Superintendent of Operation, Crewe.

Mr. B. Sherwood, Assistant Stevedore, Goole, to be Chief Docks Inspector, Garston Docks.

Mr. E. N. B. Jeffrey, Running Foreman, Kentish Town, to be District Locomotive Superintendent's Assistant, Devons Road.

Chief Commercial Manager's Department

Mr. W. Sinclair, Assistant to District Passenger Manager, Manchester, to be Assistant District Passenger Manager, Birmingham.

Mr. G. Dowling, Deputy Parcels Agent, Manchester, to be Assistant to District Passenger Manager, Manchester.

Mr. A. Moreland, Chief Commercial Clerk, District Goods Manager's Office, Liverpool, to be Assistant to District Goods Manager (Commercial), Liverpool.

Chief Stores Superintendent's Department

Mr. E. J. Miller, Clerk, Euston, to be Deputy Resident Storekeeper, Carriage & Wagon Stores, Derby.

Mr. W. McFarlane has been elected a director of Albion Motors Limited as from July 1. Mr. McFarlane, who is well known as Secretary to this Glasgow firm of commercial motor vehicle manufacturers, is retaining the secretaryship as well as holding a seat on the board.

Mr. Leslie Hore-Belisha, M.P., who, as briefly recorded in last week's issue, has been appointed Minister of Transport, has held the offices of Parliamentary Secretary to the Board of Trade and Financial Secretary to the Treasury in this Government. He was educated at Clifton College, in Paris, and Heidelberg, and at St. John's College, Oxford, where in 1919 he was elected President of the Oxford Union Society. He served in the Army during the War,

and now Minister of Labour, was on July 7 sworn of the Privy Council, and took his place at the Board accordingly.

It was announced on July 5 that Lt.-Col. Cuthbert Headlam had, for private reasons, resigned the office of Parliamentary Secretary to Ministry of Transport, and that the resignation had been accepted.

Mr. A. S. Ray, the General Agent of the Canadian Pacific at Bristol, retired on July 1 after completing 24 years' service with the company. He is being succeeded by Mr. T. W. Thorne, who is well known in West of England shipping circles, having spent the whole of his business career with the Elder-Dempster Line, and later with the Canadian-Pacific in Bristol.

We regret to record the death at Peacehaven on July 5 of Mr. William Martin Billinton. He was a brother of Mr. L. B. Billinton, Locomotive Superintendent, L.B.S.C.R., from 1912 to 1922, and therefore a son of Mr. R. J. Billinton, Locomotive Superintendent, L.B.S.C.R., from 1889 to 1904. Mr. W. M. Billinton was in business in India for some time, where he acted as agent for G. D. Peters & Co. Ltd.

SOUTH AMERICAN RAILWAY OFFICERS VISITING ENGLAND

The following railway officers from South America are paying visits to England:—

Mr. W. P. Deakin, Chief Mechanical Engineer, Central Argentine Railway.

Mr. P. C. Dewhurst, Chief Mechanical Engineer, Central Uruguay Railway.

Mr. C. R. Gabb, Chief Draughtsman, Buenos Ayres Western Railway.

Mr. P. C. Saccaggio, Technical Adviser, Buenos Ayres Great Southern and Buenos Ayres Western Railways.

Mr. D. C. Mannington, Traction Superintendent, Entre Rios and Argentine North Eastern Railways.

Mr. F. C. Pearson, Traffic Superintendent, Central Uruguay Railway.

Maj. O. Loewenthal, General Manager, Entre Rios and Argentine North Eastern Railways.

Mr. R. G. Monkman, Traffic Superintendent, Central Cordoba Railway.

INDIAN RAILWAY STAFF CHANGES

Mr. I. W. K. Smith, Deputy Chief Engineer, E.I.R., has been granted nine months' leave as from June 1.



Mr. Leslie Hore-Belisha, M.P.,

who has been appointed Minister of Transport

attained the rank of Major and was mentioned in despatches. He has recently been gazetted Honorary Colonel in the 43rd (Wessex) Division, R.A.S.C. Called to the Bar in 1923, he has represented the Devonport Division since that year and is Chairman of the Liberal National Members of Parliament. Mr. Hore-Belisha has now vacated the position of Financial Secretary to the Treasury, which he has held since 1932, to succeed the Hon. Oliver Stanley, M.P., as Minister of Transport, on the appointment of the latter to be Minister of Labour, a post carrying Cabinet rank.

The Hon. Oliver F. G. Stanley, M.C., M.P., formerly Minister of Transport,



General view of the exhibition of permanent way, at Charing Cross (Underground) station, where the exhibition portion of the booking hall was placed at the disposal of the Permanent Way Institution by the London Passenger Transport Board



The left-hand corner of the permanent way exhibition at Charing Cross, showing railway photographs, posters, and specimens of rails, sleepers, and other materials and appliances

Permanent Way Institution Jubilee Convention

Jubilee Convention Dinner and Meeting—Paper by Mr. A. Newlands on "The Railway Highway"—Programme of Visits—Exhibition

During the past week the members of the Permanent Way Institution have been celebrating the 50th anniversary of the foundation of their Institution by holding a Jubilee Convention in London, which began on Saturday last with the annual summer general meeting and dinner and continued until yesterday (Thursday) with a series of visits. Every summer the Institution holds a convention, the centre of which is varied from year to year. This summer, to celebrate the Jubilee, special arrangements were made and include an exhibition at Charing Cross (Underground) station (of which photographs are reproduced herewith) showing the development of permanent way from the earliest times to the present.

The Jubilee Dinner was held at the Café Royal on Saturday, July 7, when the President, Mr. Arthur R. Cooper, Chief Engineer, London Passenger Transport Board, presided over a gathering of some 300 members and guests.

In the unavoidable absence of Lord

Ashfield, Sir Henry Maybury, G.B.E., K.C.M.G., C.B., President of the Institution of Civil Engineers, was the principal guest, and among those present were:—

Messrs. W. A. Agnew, R. Carpmal, A. A. M. Durrant, G. Ellson, H. J. Green, Sir Gordon Hearn, Messrs. F. E. Harrison, J. W. Melville, J. Miller, Lt.-Col. A. H. L. Mount, Messrs. S. L. Murgatroyd, A. Newlands, A. S. Quartermaine, V. A. M. Robertson, N. P. P. Sandberg, O. F. Sandberg, C. E. R. Sherrington, A. W. Szlumper, J. P. Thomas, W. K. Wallace, Owen R. Williams and W. V. Wood. At the Dinner were two Founding members of the Institution, Messrs. J. Curtis and B. Tazewell.

In giving the toast of "The Permanent Way Institution," Sir Henry Maybury expressed regret at Lord Ashfield's inability to be present owing to his recent indisposition, and read a letter which had been received from him. In this letter his Lordship expressed the gratification of himself and his colleagues on the London Passenger Transport Board, as well as that of the officers of the board, at the honour con-

ferred upon Mr. Cooper in being appointed President of the Permanent Way Institution. His Lordship's letter also stated that he had read with interest the illuminating account of the history and work of the Institution which appeared in the Special P.W.I. Jubilee Souvenir Supplement to the July issue of *The Railway Engineer*, and was consequently anxious to give any encouragement he could to a continuance of its work. He thought the activities of the Branch Sections of the Institution, both in Great Britain and abroad, were a striking tribute to the success of the Institution, and felt that these gatherings, with the opportunities they provided for mutual improvement and social advantage, must inevitably create a wider outlook in the individual than would otherwise be possible. He congratulated the Institution upon the celebration of its Jubilee, and wished those present at the dinner a very enjoyable evening.

Sir Henry said there was little to add to what was contained in Lord Ashfield's letter. It was a subject of congratulation that the Institution had reached its Jubilee. It had great traditions behind it, and he was sure that those who followed would see that the



The right-hand corner of the permanent way exhibition at Charing Cross, showing early types of track and signals and a modern motor rail trolley



Photo] The Jubilee Dinner of the Permanent Way Institution, held at the Café Royal, London, on Saturday last, under the presidency of Mr. Arthur R. Cooper [Raymond Limited

torch which had been so well lighted was handed on without losing any of its lustre. The old days of "rules of thumbs" had gone and had given way to a much more scientific and accurate procedure than obtained hitherto. When one considered the great works accomplished on the railways of Britain, and the excellence of the permanent way, one realised that the permanent way staff were responsible for the safest place in the world. The skill and ability which they exercised was the admiration of the engineering institutions of the world.

Continuing, Sir Henry said that transport was very essential to the country, and the problem of transporting the people of London attending to the city's great industries was a huge one. Ten million people had to be moved each day, and one-fifth of that number were conveyed upon the underground railways and the suburban main lines—a huge and efficient service. In conclusion, Sir Henry expressed the hope that the Institution would flourish root and branch, for ever, and coupled with the toast the name of Mr. Arthur R. Cooper, the President.

Responding to Sir Henry Maybury's toast, Mr. Cooper first expressed pleasure at the letter which had been received from Lord Ashfield and undertook to write to his Lordship expressing the wishes of all present for his speedy restoration to complete health.

It was with pleasure that the members welcomed Sir Henry among them. They welcomed him as the President of the Institution of Civil Engineers, the premier engineering institution of the world, as a member of the London Passenger Transport Board, and as one interested in permanent way work and the activities of their Institution. The address which he had given would do much to create fresh interest in the Institution.

Referring to the Jubilee Convention, Mr. Cooper said he felt sure the members would derive much pleasure from the excellent programme of visits which had been arranged. They were much indebted to the railway companies for the assistance given to commemorate the Jubilee in a fitting manner. Not only had financial assistance been received, but travelling facilities had been provided, and this went to show that the work of the Institution was approved by the railway companies. It was very pleasing that so many were taking part in the Convention; also that the present, and some of the retired main line Chief Engineers were present.

Mr. Cooper went on to refer to the question which the Council had under consideration of the issue of diplomas to those having a requisite standard of knowledge, such awards taking account of successful results obtained in examinations held by the railway companies and various technical institutions.

In conclusion, Mr. Cooper referred to his visits to most of the Sections of the Institution, and paid tribute to the

excellent work performed by the local officers. The Institution was much indebted to them.

Mr. W. K. Wallace, Chief Engineer of the L.M.S.R., proposing the toast of "The Guests," made special reference to the following: Mr. W. V. Wood, a Vice-President of that company; Lieut.-Colonel A. H. L. Mount, who was recognised as guide, philosopher and friend of railway engineers; Sir Henry Maybury, who, as President of the Institution of Civil Engineers, could be said to have had conferred upon him the highest honour the profession could give; Major Carter, the Manager of the Post Office (London) Railway; Mr. C. E. R. Sherrington, the Secretary of the Railway Research Service, which was a source of much useful information; Mr. J. P. Thomas, General Manager (Railways) of the London Passenger Transport Board, who had so kindly sanctioned the very interesting exhibition of permanent way materials at Charing Cross station; Mr. W. A. Agnew, the Chief Mechanical Engineer of the Board; and Mr. Durrant, Chief Engineer of the Central Omnibus Section. The presence of such distinguished guests did honour to the Institution, which, although 50 years old, was never younger than to-day.

Mr. W. V. Wood, responding, associated himself, on behalf of his company and the other main line railways, with what Lord Ashfield had said in his letter about the Institution. He knew that each of the General Managers would have been present but for unavoidable reasons. He agreed entirely with what Sir Henry Maybury had said about British permanent way, but thought that something could with advantage be learned from comparison with the practice in other countries.

Mr. Cooper expressed the thanks of the members to the Special Committee which had been responsible for the arrangements for the dinner and for the Convention as a whole, making special reference to Mr. V. A. M. Robertson and Mr. H. Janes, who had acted as Chairman and Secretary respectively of the Committee.

Mr. V. A. M. Robertson suitably acknowledged Mr. Cooper's remarks, and said that what the Committee had been able to arrange would not have been possible without the help which had been received from the railway companies and others. In particular, he desired to mention the members of the sub-committee who had been responsible for the exhibition at Charing Cross.

Between the speeches, the guests were entertained by concert items, the artists being Maurice Charles (Humorous Cartoonist); Robert Easton (Bass); Norman Long (Entertainer at the Piano); Percy Albert (Entertainer); Walter Maggs (Boy Soloist); and Bernard Barker (Accompanist).

It had been intended for a programme of music to be given during the dinner by a portion of the band of

H.M. Royal Engineers, but this had to be abandoned by reason of an unfortunate road accident at Bexley Heath to the motor coach in which the band was travelling, which resulted in the death of a bandsman.

The dinner was preceded by the annual summer meeting of the Institution, at which a gratifying increase in

membership and a substantial balance on the year's working was reported. Awards for papers read during 1933 were given by the President, after which Mr. A. Newlands, C.B.E., late Chief Engineer of the L.M.S.R. and a past President of the Institution, read a paper entitled "The Railway Highway," an abstract of which follows.

The Railway Highway

A very complete account of the development of recognised routes of communication from prehistoric days to the present time was given at the opening meeting of the Permanent Way Institution Jubilee Convention on July 7 by Mr. Alexander Newlands, late Chief Engineer, L.M.S.R., and a past President of the Institution.

Under the title, "The Railway Highway," Mr. Newlands opened his paper by an examination of the probable genesis of the wheel, first as a development of the crude tree-trunk roller arrived at by narrowing down the trunk in the centre until it resembled a dumb-bell, and later by cutting discs from a tree-trunk and mounting them on a connecting wooden spar, or axle. The term "axle-tree" endorsed this theory.

Better means of transport demanded improved routes for their utilisation, and at some unknown date the primitive track levelled out by the passage of generations of foot passengers gave way to the first road. It was recorded that the Egyptian King Cheops had constructed a huge causeway for the transport of the materials required in the construction of the Great Pyramid, and similar facilities must have been devised by the ancient builders of Chaldea and Mesopotamia, but the credit for the creation of a road system for general transport belonged to the Carthaginians or Romans. At the time of the Roman occupation of this country there were 52,964 miles of roads in the Roman Empire, to the development of which, indeed, roads had largely contributed. Unemployed labour had been freely used in their construction.

Roads, however, only permitted the speed of travel to be raised to the point obtainable by the frequent provision of relays of horses. One hundred miles a day was the practicable maximum in the Roman Empire, where, on the State highways, horses could be changed every five or six miles, although two hundred miles were once covered in a day by the Emperor Tiberius when travelling to visit a dying brother. The capacity of the horse remained the limiting factor in the speed of travel for many centuries. When Sir Robert Peel hastened home from Rome to London in 1834 to take up his appointment as Prime Minister, his journey took thirteen days, or the same time as

would have been allowed by a Roman official.

Long before the advent of the Romans, however, the early inhabitants of these islands had developed trade routes along the systems of high ground, where firm soil, freedom from forest vegetation and greater safety from attacks by wild animals had commended them as avenues of communication. These tracks, or ridgeways, could still be traced continuously over long distances. The fact that the early Britons used chariots in their attempts to repel the invading Romans suggested that they had been used for wheeled traffic.

After the Roman evacuation of Great Britain, the road system had been neglected for several centuries, although the foresight with which it had been planned was evident from the fact that the routes selected were still substantially followed when railway construction was started almost fifteen hundred years later.

It was not until 1663 that the turnpike road system was inaugurated as a step towards improving the appalling conditions into which British highway communications had sunk by making maintenance the responsibility of their users. Even so, road surfaces were deplorable throughout the eighteenth century. In 1753 the Lancashire and Cheshire stage coach still took ten days in summer and eleven in winter to complete its journey from London. Heavy vehicles could not approach nearer to Liverpool than Warrington owing to the state of the roads.

Although no point in Great Britain is more than ninety miles from the sea, inland waterway communication developed early and extensively. Canalisation of rivers, however, preceded the creation of a regular canal system by many years, and it was not until the eighteenth century that the canal era proper was inaugurated. When fully under way, its extension was so rapid that between 1760 and 1803 no less than 2,295 miles of inland waterway were opened to the public. The development of canals coincided with the startling progress of the industrial revolution. The demand for the transport of coal and heavy goods was such that the canals, providing the only suitable service for this purpose, abused their monopoly by a disregard of the delays, loss and inconvenience they

inflicted upon their patrons. Such an attitude was soon to find its punishment in the shape of the paralysing competition of the railways.

Meanwhile, passenger transport still belonged to the roads, and an improvement of facilities was long overdue. The first stage coach between Edinburgh and Glasgow in 1678 took six days to complete the journey of 40 miles. The demand for speed soon grew in insistence, but even a hundred years later a coach making the journey between Warrington and London in three days was described as a "flying machine." Travel, however, was still not lightly undertaken, and an inquiry in 1839 showed that less than two million persons travelled annually by stage coach.

The introduction of the first rail-road in the fifteenth century gave no hint of the still distant development of transport over a specially constructed track. The rails were of wood, and the line was laid down to provide easier transport of coal from certain Tyneside workings. The wagons were drawn by horses, and the provision of a smoother surface than that afforded by the road enabled considerably greater loads to be worked. Comparisons of the haulage capacity of a horse on the three then existing transport systems showed a paying load and speed of 160 ton miles at 2 miles an hour on a rail-road, 400 ton miles at $2\frac{1}{2}$ miles an hour on a canal, and 15 cwt. on the English roads. The corresponding costs per ton mile were twopence, one halfpenny, and a sum ranging from sixpence to one shilling, according to the road surface. Mr. Newlands here pointed out that the American term "railroad" is actually more correct to describe what was originally a direct development of the road designed to attain a further reduction of frictional losses than is the word "railway."

The early horse-operated railways were built as feeders to the canals, but as the canals continued to abuse their monopolistic position, the idea that the railways should actually supplant them began to take shape. George Stephenson advocated the construction of a railway in preference to a road or canal to afford a better outlet for the South Durham coalfield, and the result of his decision was an Act of incorporation in 1821 and the opening of the steam worked Stockton and Darlington Railway, in 1825.

Influential parliamentary opposition, however, involved the early companies in heavy expenses before work could be put in hand and the embryo Great Western paid away £90,000 before a sod was cut. This was followed by an average outlay of £68,090 a mile constructed. Other characteristic figures were £65,250 a mile for the Great Eastern, £63,267 a mile for the Manchester and Leeds, £55,330 a mile for the Eastern Counties, and £18,630 a mile for the Glasgow and Paisley. By

the end of the nineteenth century £440 million were invested in railways. It had at first been anticipated that the roads would retain the bulk of passenger traffic, yet towards the end of the century, with over 6,000 miles open for traffic, 63 million passengers were carried annually.

Collaterally with the development of the railway system, the population of Great Britain increased enormously. In 1801 there were only two people in the country for every nine to-day. Such expansion would have been impossible without the service for the rapid transport of essential commodities provided by the railways.

To-day, the development of road vehicles has faced the railways with a new and serious competitor. Mr. Newlands referred to the fact that mechanical road transport was in itself no novelty, but that the present situation came about from an unholy alliance between rubber and oil. Pneumatic tyres and the petrol engine had saved the potentialities of the road system laid down by the Romans. At the present time, the railway route mileage is $11\frac{1}{2}$ per cent. of that of the roads. But although road vehicles had a path provided for them, it was inadequate for exploitation until huge sums had been spent on rebuilding and improvements. The annual expenditure for this purpose rose from £14½ million in 1902 to £60 million in 1931. Between 1921 and 1931 some £300 million of public money, apart from

that levied for licences and petrol tax, had been spent on the roads. This represented one-third of the capital cost of the land, permanent way, stations and signalling equipment of the railways.

In discussing road and rail competition, Mr. Newlands emphasised the fact that the two services provide different facilities. The railway was a multiple unit mass movement carrier, and even in a bad year like 1931 it had transported 250 million tons of goods and 1,186 million passengers. The roads could not expect to take over a transport service of this magnitude.

Railway capacity to handle traffic, however, is first of all measured by its miles of track, and in the maintenance of this it bears a heavier burden than do any of its transport competitors for a similar purpose. Seventy-two per cent. of railway capital is absorbed in this alone. This, however, is a disadvantage arising from the railway's private status. An advantage due to the same cause is its splendid safety record. Mr. Newlands contrasted the single figure fatalities to railway passengers in recent years with the average of one death every seventy-five minutes on the roads. He concluded with a reference to the diminution in coal traffic brought about by the distribution of electric power and to the possibility of a pipe-line system for coal gas and oil. These were considerations which the railways would have to face and reorient their policy accordingly.

P.W.I. Convention Visits

A comprehensive programme of visits and excursions was arranged for members and guests attending the Jubilee Convention of the Permanent Way Institution in London from July 7 to July 12. The dates and particulars of the outings were as follow:—

July 8 (Afternoon).—Visit to Whipsnade Zoological Park, near Luton.

July 9 (Morning).—Inspection of Peek Frean Company's biscuit works; visit to the Ford motor works at Dagenham; inspection of Mount Pleasant sorting office and Post Office (London) tube railway; inspection of Battersea power station; inspection of L.P.T.B. shops at Lillie Bridge and Parsons Green. (Afternoon): steam launch trip from Richmond to Hampton Court and back.

July 10 (Morning).—Inspection of the *Olympic* at Southampton. (Afternoon): inspection of Southern Railway dock extension; inspection of Southern Railway shops at Redbridge; visit to the Pirelli cable works at Eastleigh; motor coach tour to New Forest.

July 11 (Morning).—Inspection of London (Croydon) air port and Imperial Airways premises at Croydon; inspection of Mount Pleasant sorting office and Post Office (London) tube railway; inspection of Battersea power station. (Afternoon).—Inspection of H.M.V.

works at Hayes; tour of Broadcasting House.

July 12 (Morning and Afternoon).—Inspection of L.P.T.B. omnibus works at Chiswick and Mechanical Engineer's shops at Acton; motor coach tour to Burnham Beeches.



Photo]

[Norman C. Davis

A group taken on the "*Olympic*" on Tuesday. It includes the President and Mrs. and Miss Cooper, Mr. Trevor Lewis (White Star Line), Mr. V. A. M. Robertson, Mr. H. Janes, and Mr. R. Carpmael

New Central African Railway

Line from Congo Basin to the Atlantic forms part of new economic development of French Equatorial Africa

(See illustrations on page 60)

After being under construction for over five years, the so-called Congo-Ocean Railway, running from Brazzaville on the Congo river to Pointe Noire on the Atlantic seaboard, was formally opened on July 10 by M. Antonetti, Governor-General of French Equatorial Africa, in which territory the railway lies for the whole 319 miles of its length.

Conceived in better times than the present, with a view to facilitating the export of those products of French Equatorial Africa which come down the Congo, the line will not result in any great change in the transport system of the Congo basin, taken as a whole, and is in no sense a competitor of the Belgian Leopoldville-Matadi line on the opposite bank, by which the produce of the Belgian colony which comes down the various branches of the river is taken past the series of rapids existing between Stanleyville and the coast. A certain amount of additional traffic is expected from the copper deposits near the line in the Minduli district.

A good deal of difficulty was met with in the construction of the line, due principally to the rugged nature of the country traversed, but also to the bad seasonal climate. From Pointe Noire, which is to be made into the main port for French Equatorial Africa, the line follows generally the valley of the River Niari, rising the whole way to the Bamba mountains, through which the line is carried by a series of viaducts and tunnels. After emerging from the eastern portal of the main Bamba tunnel, the line traverses a high plateau for 150 miles, crossing, en route, the river Loudima by a viaduct, with a span of over 100 ft., and then gradually descending through Minduli to the Congo basin at Brazzaville.

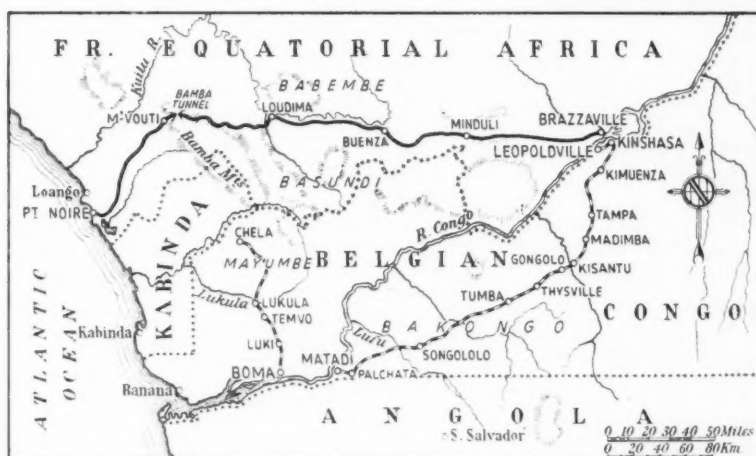
Constructional work was put in hand from each end, and the section from Brazzaville to Minduli was completed at an early stage. As the line was laid from Pointe Noire, materials were taken in wagons to the railhead and then passed forward by special rough-country tractors to the various sections under construction. This method of working has also been in force for a certain amount of goods traffic since the end of 1932, when five wagon loads of merchandise from France were sent inland from Pointe Noire to Brazzaville; at that time 215 miles of rail were in position, although in several isolated sections. The N'kanke and Loudima viaducts, the former, with a total length of 280 ft. and a central span of 150 ft., were completed during the summer of 1933, and the greatest work, the Bamba tunnel, in April last.

The piercing of this tunnel was finally accomplished in October, 1933, after 4½ years' work. In March, 1930,

after 660 ft. of the gallery had been pierced, part of it fell in, and with some difficulty the roof was shored up with timbers. At the end of the same year progress was retarded by an inrush of water at the rate of 175 cu. ft. per sec., and flooding occurred later at frequent intervals. Boring from the eastern face was begun in August, 1931, when the completion of the line from the coast to M'Vouti enabled four 50 h.p. diesel-driven compressors and

two special underground tractors to be brought by rail close to the scene of operations. Alternations of crumbling and hard rock were encountered throughout the tunnel, whose length of 1,850 yd. makes it the longest in Central Africa.

A certain amount of passenger and light goods traffic has been worked since the beginning of this year over the 160 miles from Brazzaville to Kayes, when it has been conveyed in lorries via Madinjou to the railhead of the Pointe Noire division. Several four-wheeled petrol railcars are being used for passenger traffic, and it is understood that further units of the same type are to be purchased, although steam traction will nominally be the operating medium of the line.



Sketch map of new Congo-Ocean Railway (shown black), formally opened on Tuesday. The Belgian Congo railways are shown with a black and white line

The Railway Position in China

In the course of his report on China and the depression recently presented to the government of that country, Sir Arthur Salter summarised the principal factors confronting those now engaged upon the study of the Chinese railway problem. China possesses a natural asset to its system of communication in its long coastline, which has ensured the economic development of the maritime towns. Inland, however, the canals, supplemented by the rivers, leave many regions untapped. To extend the canal system would be costly and uneconomic, owing to the slow speed of transport thus provided. Road development, too, will not solve the problems of an interior where intensive short-distance carriage is not required, and the amount of traffic available hardly justifies the import of an expensive fuel, particularly when coal is produced at home. The roads, therefore, must play a secondary and supplementary part in Chinese communications. They can act as a temporary substitute in places where rail-

ways cannot yet be provided, and as permanent feeders to the main sea, river, canal, and railway system, as well as relieving pressure on the railways by linking centres of dense population when the distances between them are short.

The vital part still to be played in China's development has been demonstrated by the lines already in existence. Where these have been favoured by competent administration and free from political vicissitudes, they have shown their earning capacity and their utility in opening up the regions served. The existing railway system, however, is inadequate both in scope and equipment for the country's needs. The two main lines, running north and south (the great rivers flow west and east), comprise only some 7,000 miles of track. In a few years one of these routes will be extended to link Canton with Hankow, and will open an important west-east line, together with a number of subsidiary branches. The development of the railway system is

a vital factor in foreign capital to China. Granting political stability and a plan for solving the communications problem, money would be forthcoming from abroad for the railways themselves and to finance the industrial development which would inevitably follow.

Reviewing the results of the railways already established in the country, Sir Arthur Salter shows that not only do these compare favourably with the rest of the world when political and management conditions have been favourable, but that there seems to be greater scope for the economic productivity of railway systems in China than anywhere else. But of late years the repercussions of political upheavals upon the railways have been added to by increasingly costly and inefficient administration. The ratio of operating expenses to operating revenue rose from 54 per cent. in 1920-24 to 65 per cent. in 1928-31. This was partly due to unnecessary increases in personnel and partly to faulty control of general outlay.

Although passenger traffic has lately increased, goods receipts have remained stationary. The fixing of high rates has turned away sufficient traffic from the railways to counterbalance the additional revenue on goods carried. There is a great need of operating managers with technical, as opposed to official, experience, who would adjust rates to attract traffic and yet ensure a fair return for the companies. This work will need to be combined with the rehabilitation of railway equipment. Most of the rails were laid down a quarter of a century ago. Bridges, sleepers, track and rolling stock have been allowed seriously to deteriorate.

The Chinese railways also carry a heavy burden of debt. Their financial position has been made increasingly difficult both by the necessity of providing virtually free transport for government troops and by the exactions of the very war lords these troops were supposed to suppress. Local government authorities have in the past imposed irregular financial exactions with which the railways were forced to comply. Such obstacles to progress are, however, being removed, and were it certain that a policy of railway development could be carried through without political interruptions, the capital attracted for the purpose would at once lay the foundations of economic growth over many years in the new regions tapped and substantially correct the adverse balance of payments.

THE MOSCOW UNDERGROUND.—According to a message from Riga, a Soviet tribunal has condemned to death two officials charged with malversation in connection with the supply of materials for the underground railway now being constructed in Moscow.

German Long-Distance Running

As a supplement to the details of current German railway speeds appearing in our issue of June 1, we give herewith a table showing the non-stop runs exceeding 120 miles in length which are performed daily in Germany.

GERMAN NON-STOP RUNS EXCEEDING 120 MILES

Between	Distance	Time	Speed	No. of Runs Daily
	miles	min.	m.p.h.	
Halle and Nuremberg	195.0	226	51.8	2
Berlin and Hamburg	178.1	138†	77.4‡	4‡
Munich and Würzburg	172.0	183	56.4	6
Erfurt and Frankfurt	166.8	186	53.2	4
Hanover and Berlin (Zoo)	157.8	148*	65.8	8
Charlottenburg and Hanover	156.5	162	58.0	4
Stuttgart and Munich	136.5	170	48.2	2§
Nuremberg and Stuttgart	126.1	163	46.4	2
Munich and Nuremberg	123.3	120	61.7	4
Schneidemühl and Marienburg	122.8	152	48.5	2††

* Two runs in this time.

† By "Flying Hamburger" railcar.

‡ Two runs by "Flying Hamburger" railcar.

§ Electrically-operated.

|| The south-bound train stops at Probstzella (97.4 miles from Halle) for banking assistance, and the north-bound train at Rothenkirchen (81.8 miles from Nuremberg) for the same purpose; in the latter case a run of 113.2 miles follows from Rothenkirchen to Halle.

†† Includes working stop at Craisheim.

‡‡ Includes stops at Konitz and Dirschau to change engines.

The list is headed by the run of the "FD" Berlin-Munich service between Halle and Nuremberg; these expresses in each direction perform three consecutive runs of over 100 miles in length, Berlin-Halle, Halle-Nuremberg, and Nuremberg-Munich, respectively 100.4, 195.0, and 123.3 miles, and beginning and ending, in the northbound direction, with runs timed at 61.7 and 64.8 m.p.h. from start-to-stop. On the Halle-Nuremberg runs it is customary, however, to take banking assistance over the heavy grades between Probstzella and Rothenkirchen, which necessitates a stop at the former station (97.4 miles from Halle) going south, and at Rothenkirchen (81.8 miles from Nuremberg) going north. The lower speeds in the case of the runs to and from Stuttgart are explained by the heavy gradients on the routes concerned; it should be added that a working stop is made at Craisheim, on the Nuremberg-Stuttgart run, as the signalling at Craisheim does not permit of through running. Interest attaches to the Schneidemühl-Marienburg run in that it connects Prussia with East Prussia across the Polish Corridor, on the route from Berlin to Königsberg; but although nominally non-stop, this

run includes stops at Konitz and Dirschau, the two frontier stations of the Corridor, between which the train is worked by Polish locomotives. In addition to the journeys here tabulated, six daily non-stop runs are made between Hanover and Hamm, 109.6 miles, one between Cologne and Ettville, 106.4 miles, 15 between Berlin and Leipzig, 102.2 miles, and 12 between Berlin and Halle, 100.4 miles, making a total of 76 runs nominally and 71 runs actually exceeding 100 miles in length.

The final table shows the overall speed of the best trains on the principal long-distance services in Germany. In all cases but the Berlin-Königsberg service, these times are made by "FD" express trains, at supplementary fare; over the principal routes one such express runs in each direction daily, or in certain cases two, giving a substantial advantage in time over the ordinary "D" express trains in exchange for the supplement. In every case it will be seen that an overall speed in excess of 50 m.p.h. is provided, notwithstanding that on several of these runs the time includes five, or even six, intermediate stops. On others lengthy stops are made, such as the Berlin-Cologne "FD" service; the 17.00 express from Cologne to Berlin, by which the 54.7 m.p.h. overall speed is achieved, stops for 7 min. at Elberfeld, 2 min. at Hagen, 9 min. at Hamm, and 11 min. at Hanover, leaving an actual running time of 346 min. for the 342.1 miles, and an average speed throughout of 59.3 m.p.h.

GERMAN LONG-DISTANCE SERVICES

Between	Distance	Fastest Train	
		Time	Speed†
		hr. min.	m.p.h.
Berlin and Leipzig ...	102.2	1 34	65.2*
Berlin and Dresden...	109.3	1 53	58.0
Berlin and Hamburg	178.1	2 18‡	77.4*
Berlin and Breslau...	204.6	3 52	52.9
Berlin and Nuremberg	295.4	5 25	54.5
Berlin and Frankfurt	335.3	6 13	53.9
Berlin and Cologne...	342.1	6 15	54.7
Cologne and Basle ...	347.5	6 10§	56.4
Berlin and Königsberg	365.7	7 07	51.4
Cologne and Munich	394.0	7 52	50.1
Berlin and Munich ...	418.7	7 32	55.6

* Non-stop.

† Including stops.

‡ "Flying Hamburger" railcar.

§ Rheingold Express.

THE TOTAL FRENCH RAILWAY STAFF.—The number of employees of the French railways, including the auxiliary staff, had, on January 1, 1934, been reduced to 444,956, from 511,683 on January 1, 1931. These figures include the administrative services. The total cost of the staff in 1933 was about £105,000,000 (at 80 francs to the £1).

The Scandinavian Train Ferries

The plan to run passenger train ferries across the English Channel, where the weather conditions are more severe than is usually the case with such services, makes it of interest to review briefly the development of the train ferry routes between Germany and Scandinavia, hitherto the most important in Europe. These ferries have conclusively demonstrated what can be accomplished by this form of transport in suitable circumstances. A comprehensive account of the German-Scandinavian train ferry services has been given by Dr. P. H. Seraphim in *Archiv für Eisenbahnwesen*, from which we take the following particulars.

The conditions for ferry services between Germany and Scandinavia are, generally speaking, very favourable. The open sea distances are not too great—100 km. by the longest route—and the sea is usually calm. At the same time, there is a considerable passenger traffic, a large proportion being of the tourist class and a fair amount of freight. Up to the sixties of last century, the passenger traffic between Germany and the Scandinavian countries was dealt with almost exclusively via Denmark, goods being sent by sea via Lübeck or Stettin. The Prussian and Mecklenburg lines were then in competition and tried to divert traffic from each other's systems. Fast steamers were put on between Stralsund and Malmö in 1855, and eight years later between Rostock and Nyköping. Subsequently other lines came into being, but the vessels were at first worked by separate companies and not by the railways. It was in 1903 that the steam packet service between Warnemünde and Gjedser was converted into a train ferry by the Mecklenburg and Danish Railway Administrations, four ferry steamers being put on the route, to allow of which a good deal of money had to be spent in altering the harbours and installing the necessary special landing quays and equipment. The venture proved a success from the beginning. In the first year, 75,000 passengers were carried, an increase of 50 per cent. over the previous year, and one effect of the change was to attract traffic away from the steamers, then running between Sassnitz and Trälleborg. The result was that in 1909 Sweden and Germany concluded an agreement to change this service over to ferry boat working. The Reichsbahn has, of course, since taken over the rights and responsibilities connected with all the ferries. On each route the fares and rates are regulated according to an agreed tariff, receipts being taken by the respective administrations up to a determined mid-sea point, each undertaking bearing the costs of running and maintaining the vessels under its own flag and each performing the same number of trips in

a given period. The vessels on the Sassnitz-Trälleborg route were somewhat faster than those on the others. Some very fine boats have made their appearance in recent years. Generally speaking, the traffic is worked with remarkable regularity, save for an occasional interruption due to exceptionally severe winter weather.

An analysis of the traffic on the ferry services shows that their popularity steadily increased up to the end of 1913, in which year the number of boat journeys was 4,066 between Warnemünde and Gjedser and 2,234 on the Sassnitz-Trälleborg route. On the Danish-Swedish service between Copenhagen and Malmö, over which much German traffic passes, the number of trips was 3,334. The war produced a heavy fall, but the Sassnitz-Trälleborg line managed to recover its traffic fairly well soon afterwards, the other routes not doing so until some three or four years ago. To-day, the Sassnitz and Copenhagen lines show a substantial increase in ferry trips over 1913, and the Warnemünde line is now at about pre-war level. In the matter of freight traffic, the Sassnitz-Trälleborg route has developed more satisfactorily than the others and also provides more space on the vessels for goods vehicles.

The conveyance of through passenger coaches plays a much more important part on the Sassnitz service, where the sea passage is much longer (100 km.) than on the other routes, than it does between Copenhagen and Malmö, where it is only 30 km. About eight times as many passenger coach axles are conveyed on the Sassnitz service as on that to and from Malmö.

When the ferry services were instituted, goods traffic played no great part upon them, but it had amounted to an appreciable quantity a year or two before the war. It has developed further since then, but has not quite reached its old level on the Copenhagen route. There is a considerable disparity between the quantity of freight carried on the outward and inward journeys, the proportion being as 7 to 5 from and to Trälleborg on the Sassnitz route, and 3 to 1 from and to Gjedser, while from Malmö to Copenhagen the traffic is five times as great as in the reverse direction. No doubt the exchanges and other economic factors affect the position very materially. Bulk goods traffic predominates over every other kind, forming over 90 per cent. of the total quantity on one route. Here, again, the traffic is far from being equally divided between the two directions. On the Copenhagen-Malmö line in 1931, for example, the empty wagons in the Denmark to Sweden direction formed 30 per cent. of the total wagons carried, but in the other direction only 2 per cent. were empty. On the

Sassnitz line the figures were 1 per cent. to Sweden and 26 per cent. from that country. The exports from Germany are chiefly brown coal briquettes, coke, chemical products, food-stuffs and machinery, while the imports are mainly timber and ceramic products on the Sassnitz route and fish on the Danish route.

The working of these train ferries has been on the whole very satisfactory from the economic standpoint and has fully justified their institution. Compared with the pre-war years the receipts on the Sassnitz route have trebled and on the Copenhagen route have doubled themselves. It is true that before the war the Sassnitz-Trälleborg service was run at a loss, but the Copenhagen-Malmö route made sufficient profit to pay nearly 2½ per cent. on the capital invested. Since the war, however, both lines have greatly improved their position, and are now able to pay 10 per cent. to 16 per cent. and 18 per cent. to 20 per cent. respectively. The importance of the ferries for the development of passenger, and especially tourist, traffic becomes daily more apparent. In addition they play an important part in reducing the time spent on journeys between the Scandinavian cities and central and south-eastern Europe.

L.N.E.R. PUBLICATION CATALOGUE.
—Railway holiday literature has now developed to an extent which makes it increasingly difficult to keep track of the appearance of new publications. The L.N.E.R. "Guide to the Guides" folder which has just been issued, therefore, establishes a useful precedent by providing a catalogue from which the prospective traveller can select the book or pamphlet covering his interests, and at the same time be sure that he has overlooked none of those available. The folder has an attractively coloured front cover, bearing a train design and the inscription "10,001 Travel Recipes." A tourists' map of the L.N.E.R. appears on the back. All the company's holiday guides and cheap travel booklets are listed, and shown in colour. Those dealing with the subjects which appeal to the reader can be instantaneously found by reference to an ingenious index. Each publication is numbered, and a coupon is printed in the folder to make application easy.

CALLENDER'S CABLE & CONSTRUCTION Co. LTD.—We are advised by this company that it has been informed that a man giving the name of Blunden, and using a card describing himself as manager of the Transport Department of that company, has been applying for the loan of men and material. The company desires to state that it has not now nor has ever had anyone of that name in its employment and the use of the name and description is entirely unauthorised.

New Streamlined Express Railcars, G.W.R.

On Friday, July 6, a trial run was made of the first of the new streamlined express railcars recently delivered by the A.E.C. to the Great Western Railway for service between Birmingham and Cardiff. A detailed description of these cars and the schedules on which they run appears in our *Diesel Railway Traction Supplement* to this issue, and we refer to the matter also in an editorial note on page 42. A party of press representatives travelled down to Birmingham by the 9.10 a.m. train from Paddington and there joined the new car, which conveyed them to Cardiff, stopping only at Newport on the way. The run of 105.4 miles to Newport was accomplished in 115½ minutes, which was 7½ minutes less than schedule. Even so, speed had to be moderated over the latter

part of the journey in order not to arrive too long before time. On arrival at Cardiff the party was entertained to lunch by the Great Western Railway Company. Mr. K. W. C. Grand, Commercial Assistant to the Superintendent of the Line, presided, and among those present were:—

The Lord Mayor of Birmingham; the Lord Mayor of Cardiff; the Mayor of Newport; the Mayor of Gloucester, and their ladies; Messrs. G. E. Orton, Publicity Agent; W. E. Hart, Divisional Superintendent, Birmingham; S. Morris, Divisional Superintendent, Gloucester; Trevor Roberts, Divisional Superintendent, Newport; F. G. Wainwright, Divisional Superintendent, Cardiff, of the G.W.R., and Messrs. C. W. Reeve, Chairman and Managing Director; Norman A. Hardie, General Manager (Sales); G. J. Rackham, Chief Engineer; C. F. Cleaver, Director, Hardy Motors Dept.; S. W. Goodey, Publicity Manager; and L. M. Crump, A.E.C. *Gazette*; of the Associated Equipment Co. Ltd.

Mr. K. W. C. Grand explained that

the perfecting of the diesel railcar now enabled the Great Western Railway to provide fast supplementary services at very low cost, and it was hoped that the traffic which would be developed by this means would eventually grow to such an extent that it would soon be necessary to run steam trains of much greater accommodation to cope with it. In this way ultimately the consumption of Welsh coal would increase, and in any case, the running of these entirely supplementary services would not cause any decrease. The Lord Mayors of Birmingham and Cardiff paid tribute to the enterprise of the railway company, and referred to the other enterprise which was meeting with success, namely, the air service, which had been inaugurated by the Great Western last year. Mr. Norman Hardie, on behalf of the manufacturers of the car, expressed appreciation of the ready co-operation which they had received from the railway company's engineers.

A New Light Alloy

Under the name of Ceralumin "C," the firm of J. Stone & Co. Ltd., of Deptford, has introduced a new light aluminium alloy which has been developed to meet the demand for an alloy of low specific gravity and high strength, combined with good casting properties. The composition of the alloy, which is covered by British Patent No. 403,700, is as follows:—

Copper	...	2.5 per cent.
Nickel	...	1.5 "
Magnesium	...	0.8 "
Iron	...	1.2 "
Silicon	...	1.2 "
Cerium	...	0.15 "
Aluminium	...	Remainder.

From this it will be seen that Ceralumin "C" is a complex alloy of aluminium, the most novel feature being the presence of cerium. Investigations in the company's laboratories have established the fact that, in addition to its refining action on the macrostructure, cerium allows the beneficial mechanical effects of a high iron content to be obtained by suppressing the embrittling iron-aluminium constituent which is otherwise liable to be formed. In addition the small amount of cerium also confers on the alloy important advantages in the foundry; Ceralumin "C" has extremely good "running" properties and gives castings having a smooth clean surface and an attractive appearance.

The heat-treatment applicable to this alloy is quite simple. The castings are maintained at the solution temperature of 515° to 535° C. for four to six hours and are then quenched in water; ageing is achieved by heating to 175° C. for 16 hours, followed by quenching in water. The risk of distortion at the solution temperature is no greater than that involved, for example, in heat-treating "Y" alloy at 520° C., and

careful measurements on castings having unfavourable features, such as overhung arms and bosses, have failed to detect any distortion as the result of heat-treatment.

In the heat-treated condition Ceralumin "C" presents an excellent combination of high tensile strength at ordinary and elevated temperatures, high elastic limit and high Brinell hardness. These features are given in detail in the table, but special attention must be drawn to the very high fatigue strength (Wöhler, 20 million reversals) of ± 8.25 tons per sq. in., a quality which should prove of special interest to designers anxious to take the fullest advantage of the properties of available materials. Ceralumin "C" is suitable for high-duty service in the form of die-castings, chill castings and sand castings.

If the artificial ageing treatment is

replaced by ageing at room temperature for five days, a modified form of the alloy is produced which is called Ceralumin "D." By this means a somewhat lower tensile strength is obtained, but the ductility is considerably increased. This modification of Ceralumin is intended for purposes where extra toughness is required in castings, such as for shrinking-on cylinder heads where heavy stresses may be set up and a little "give" in the casting is essential.

	0.1 per cent. Proof Stress, Tons sq. in.	Maximum Stress, Tons sq. in.	Elongation, Per cent.	Brinell Hardness Number
<i>Chill Cast</i>				
Fully heat-treated ..	21-24	23-27	1.0	130-140
Quenched and aged five days at room temperature ..	13-14	19-21	4.6	98-104
No heat-treatment ..	11-12	13-14	1.3	67-77
<i>Sand Cast</i>				
Fully heat-treated ..	18-20	19-20	0.1	130-140
Quenched and aged five days at room temperature ..	11-13	14-16	1.3	98-104
No heat-treatment ..	—	8.5	0.1	72

"TWO HUNDRED YEARS OF RAILWAY LITERATURE."—A treatise on experimental philosophy in the course of which there occurs what is believed to be the first detailed description of a railway is the oldest volume listed in the new catalogue of second-hand railway books published under the above title by Grafton & Co., 51, Great Russell Street, W.C.1. The book appeared in 1734, and the line in question was the wooden railway constructed by Ralph Allen, of Prior Park, Bath, to carry stones from the quarries to the waterside. The catalogue proceeds chronologically up to the present day and gives particulars of a fine collection of unusual railway books, periodicals, pamphlets, time-tables, and maps. An interesting item is the first

volume of a series entitled "Railroadiana," which was described as "a new history of England" and was planned to present historical, legendary, and topographical information regarding the country served by the main lines of railway. The book listed deals with the London and Birmingham railway and may be regarded as the earliest ancestor of the present L.M.S.R. route books.

POLISH COAL FOR ITALY BY EXCHANGE.—The Italian State Railways have purchased 380,000 tons of coal from Poland, which will be paid for by supplying the Polish State Railways with motor cars, spare parts, accessories and motor engines.

RAILWAY AND OTHER REPORTS

Midland Bank Limited.—The directors announce an interim dividend for the half-year ended June 30 last at the rate of 16 per cent. per annum less income tax, payable on July 16 next. The same rate of dividend was declared a year ago.

Glyn, Mills & Co.—The one hundredth statement of assets and liabilities as at June 30, 1934, shows total assets of £35,699,947, as against £39,144,155 at the corresponding date last year. Coin, bank notes, and balance at the Bank of England amount to £5,027,855, compared with £6,152,514, and investments, including £9,094,594 in British Government securities, total £9,614,157, as against £11,403,395. Advances at £10,507,869 contrast with £10,827,401 at June 30, 1933. On the liabilities side current, deposit and other accounts (including provision for contingencies) amount to £32,171,228, compared with £35,704,391 a year ago.

Western Welsh Omnibus Co. Ltd.—This company, which is in association with the Great Western Railway, secured in the year ended March 31, 1934, a net profit, after providing for depreciation, of £13,425, which added to the balance of £3,381 carried forward at March 31, 1933, makes a total of £16,805 out of which the directors have written off £1,500 in reduction of preliminary expenses and propose a dividend on the ordinary shares of 5 per cent. per annum (requiring £11,238), leaving £4,068 to be carried forward. Two of the subsidiary companies—Lewis & James Limited and Eastern Valley Motor Services (Barretts) Limited are now in voluntary liquidation and their services have been taken over and operated as from October 31, 1933. The Porthcawl omnibus services of Morgan Weeks & Francis Brothers have been acquired.

Scottish Railway Stockholders Protection Association Limited.—The sixteenth annual report of the executive of this association, which now forms the Scottish Branch of the British Railway Stockholders Union Limited, reviews the traffic and dividend position of the four amalgamated companies in 1933, and points out that their net aggregate revenue in that year was only £28,804,163, as against £37,716,114 in 1930, the figure on which the unanimous decision of the National Wages Board in March, 1931, in favour of the existing cut of 4 to 5 per cent. in wages and salaries was based. Further, in the year 1933 on £311,253,585 of the stockholders' capital no dividends were paid, while on £208,431,564 only part of the fixed dividends was paid. In 1930, of the total above amounts of capital, only £35,923,810 was without any dividend. The report records that the assistance rendered to the railway companies by the Stockholders Union in obtaining

the passage of the Road and Rail Traffic Act, 1933, has been suitably acknowledged by the companies.

Bolivar Railway.—Receipts for 1933 of the Bolivar Railway Company, together with those of the Puerto Cabello & Valencia Railway which is worked by the former, were again affected by the general trade depression, while further reductions in freight rates were made to meet road competition. The total declined further from £87,805 to £71,774, but the saving in working expenses more than offset the decline, so that the loss on working was £495, against £5,144. After allowing for interest charges and the Puerto Cabello rental, and crediting sundry receipts, the total

deficit for the year is £33,255 (against £40,671), increasing the accumulated debit balance to go forward on revenue account to £202,954.

Anglo-Argentine Tramways Co. Ltd.—Gross receipts for the year 1933 were £3,039,212 against £3,506,343 in 1932, and expenses (including £116,845 loss on exchange) were £2,969,430. The credit balance before allowing for certain charges (£654,022) was £70,019, and the deficit for the year 1933 amounted to £584,003. Adding the debit balance from 1932 adjusted under the terms of the moratoria granted in June, 1934, makes a total debit balance at December 31, 1933, of £1,172,813. There was a decrease of £467,131 in gross receipts and of 55,122,468 in the number of passengers carried. In expenditure (excluding renewals and loss on exchange) there was a reduction of £250,310.

Italian Relations with Austria

(From our own correspondent)

The meeting of Signor Mussolini with the Chancellor Dollfus, and the Hungarian Premier, M. Goemboes, in May last in Rome is bearing fruit. It will be remembered that at this conference the outlines of economic collaboration were laid down and Italy agreed *inter alia* to provide special facilities at Trieste for the export and import traffic of Austria. For the purpose of co-ordinating the efforts of both governments and making the necessary arrangements, an Austrian Commission, headed by the Minister of Commerce, Herr Stockinger, arrived on June 19 at Trieste. The Under-Secretary of State for Corporations, On. Asquini, was at the head of the Italian Commission. Mr. Stockinger referred in his speech to the fact that Vienna lies at a distance of 600 km. from Trieste, whereas the distance to the North Sea ports is 1,000 km. This difference in the overland distance becomes further increased by a difference of 2,000 miles in favour of Trieste in the sea voyage to the Orient. The Minister announced that an Austrian Customs House will be established at Trieste. Among other provisions is that of the creation of a "free zone" for Austria within the port.

In order to facilitate Austrian travel to Italy, special financial arrangements have now been completed. As is known, the export of money from Austria is forbidden above a nominal sum, which was not sufficient to enable many Austrians to visit Italy. Under the new arrangement, special hotel bonds to the value of 800 schillings (£30) can now be purchased at the Tourist Offices in Austria and such bond will be accepted by all Italian hotels in payment of the hotel bill. Likewise special bonds to the

value of 50 and 100 lire can be bought in Austria by those who do not wish to tie themselves to a certain hotel or a pre-arranged route, and these special bonds will also be accepted by all Italian hotels. Furthermore, holders of either of the bonds are allowed to take with them the sum of 200 schillings in cash (£7) or foreign currencies to the value of 500 schillings (about £19).

Road Programme in Bengal

The Government of Bengal has announced a five-year road development scheme costing nearly Rs. 67 crores and involving the construction of over 200 miles of road. The programme has been prepared in consultation with the Bengal Road Board, on which the railways are represented by Mr. E. C. J. Gahan, Commercial Traffic Manager of the Bengal Nagpur Railway, and Mr. Van Someran, Traffic Manager, Eastern Bengal Railway.

Forthcoming Meetings

July 20 (Fri.)—**Egyptian Delta Light Railways** (Ordinary General), Winchester House, Old Broad Street, E.C., at 12 noon.

July 25 (Wed.)—**Bombay, Baroda & Central India Railway** (General), Southern House, E.C., at 1 p.m.

July 26 (Thurs.)—**La Guaira & Caracas Railway** (Ordinary General), Dashwood House, 69, Old Broad Street, E.C., at 12.30 p.m.

July 26 (Thurs.)—**Dorada Railway** (Ordinary General), Dashwood House, 69, Old Broad Street, E.C., at 2.30 p.m.

NOTES AND NEWS

New G.W.R. Halts.—Two new G.W.R. halts, at Tutshill, near Chepstow, and Trelewis, near Treharris, were opened on Monday, July 9.

Gathurst for Shevington Station, L.M.S.R.—Gathurst station, on the Wigan to Southport line, L.M.S.R., has been renamed Gathurst for Shevington.

Institute of Metals.—This year's annual autumn meeting—the 26th of the series—will be held in Manchester from September 3 to 6, under the chairmanship of Dr. Harold Moore, G.B.E., President of the Institute. A feature of the gathering will be the civic welcome to be given to the members by the Lord Mayor of Manchester on September 4.

Closing of Great Southern Railways Branches.—As foreshadowed in THE RAILWAY GAZETTE of June 15, the Ballina-Killala branch of the Great Southern Railways has been closed since July 2. The company also announces the closing of the following branches:—Galway-Clifden on August 27; Westport-Achill on September 3; and Cork-Coachford-Donoughmore on September 24.

Electric Railway for Turkey in Asia.—The construction of an electric railway line between Zonguldak and Ereğli will soon begin, says Reuters Trade Service from Istanbul. Technical experts from the Ministries of National Economy and Public Works are shortly leaving for Zonguldak to investigate matters on the spot. The new railway, which will take two years to complete, will link the coal basins of the district.

The Week's Road Accidents.—The Secretary to the Ministry of Transport has issued the following return, for the week ended June 30, of persons killed or injured in road accidents:—

	Killed in accidents reported during the week	Reported during the week as having died as the result of accidents occurring in previous weeks	Injured in accidents reported during the week
	No.	No.	No.
England	100	25	4,294
Wales ...	4	1	178
Scotland	7	2	489
	111	28	4,961

The total fatalities of the week as the result of road accidents were therefore 139, as compared with 133 in the preceding week.

London Transport (Finance) Bill.—The London Passenger Transport Board (Interim Financial Arrangements) Bill, which has already passed the House of Commons, was read a second time and committed in the House of Lords on July 4. It came, on June 5, before the House of Lords Committee

on Unopposed Bills, and was reported to the House without amendment. It was read a third time and passed in the House of Lords on July 11. The Bill enables the Board to postpone the accounts for the first year's working and to pay a dividend based on estimated results, subject to later adjustment.

Dublin Strike Ends.—The strike which had been in progress for over a week on the L.M.S.R. at North Wall, Dublin, was ended on Tuesday evening, July 10, pending negotiations.

Britannia Batteries.—The London sales office of Britannia Batteries Limited has been removed from 233, Shaftesbury Avenue, to 10-15, Chitty Street, Tottenham Court Road, W.1; the new telephone number is Museum 7163-5, and the telegraphic address "Britannicus, Eus. Road, London." The London Service depot remains temporarily at 15, Upper George Street, W.1, and the head office is now Britannia Works, Union Street, Redditch, Worcs.

New Gibraltar Tunnel Tests.—The Spanish Gibraltar Tunnel Commission, under the chairmanship of the Minister of Communications, Don Jose Maria Cid, has, according to Reuters, announced that it will pay an official visit to the Straits of Gibraltar in August. Important experiments in connection with the scheme will then be carried out. The estimated cost of the tunnel is £8,000,000. Financial help for the project is expected from France.

L.M.S.R. Order Confirmation Bill.—The London Midland & Scottish Railway Order Confirmation Bill was read the third time and passed in the House of Commons on July 10. It confirms a Provisional Order under the Private Legislation Procedure (Scotland) Acts, 1899 and 1933. The preamble of the draft Order, which was unopposed, was found proved in Scotland in April. It empowers the company to acquire lands in the County of Lanark, and extends the periods for the completion of various railways and works in Scotland authorised by various Caledonian Railway Acts and Orders.

Locomotive Men's Annual Holidays.—Swindon commenced its annual holiday at five o'clock last evening, when the G.W.R. Locomotive Carriage and Wagon Works closed down for 10 days. By eight o'clock this (Friday) morning nearly half the town's population of 60,000 had dispersed to more than 300 seaside resorts throughout the country. Altogether 30 special trains, measuring six miles, and composed of carriages and engines built by the holiday-makers, were run. "Trip Week," as it is called, was inaugurated in 1849, when 500 passengers travelled by special train to Oxford. From to-day, also, the Cowlairst Works of the L.N.E.R. will be

closed for the Fair holiday, re-opening on July 24, whilst the L.M.S.R.'s works at St. Rollox close to-morrow (Saturday) until July 28. In the North British Locomotive Company's establishments the holidays will extend from July 12-19.

South London Tube Extension Suggestion.—A conference of local authorities between Camberwell and West Wickham is being held at Peckham to-day to discuss the possibilities of a tube railway extension in South London.

Guest, Keen & Nettlefolds.—At the recent annual general meeting of Guest, Keen & Nettlefolds Limited, Sir John Field Beale, Chairman and Managing Director, said that the past year was one of steadily improving conditions. The works had been maintained in a state of full efficiency in the more difficult years, and with increasing trade the company was reaping the benefit of this wise policy. It was constructing new works at Cardiff for the manufacture of steel rods and bars, which should be of material advantage to the company as a whole. The scheme for reorganisation of the steel trade, to which he had referred last year, had been substantially amended, and the amended scheme had been accepted by the trade in April by an overwhelming majority. He believed the new organisation would be most helpful and satisfactory.

London Transport Bill.—The London Passenger Transport Board Bill was before a Select Committee of the House of Lords presided over by Lord Wemyss on July 10 and 11. Only two petitioners appeared against it, the Stepney Borough Council, and the London County Council. Stepney objected to a proposal to convert part of the present conduit tramways to the overhead system, and the L.C.C. opposed a clause relating to exemption of the Board's buildings from the provisions of the London Building Act. Lord Ashfield gave evidence for the promoters. The Committee decided in favour of converting the tramways between Aldgate and Grove Road, Stepney, from conduit to overhead, and allowed the building clause subject to matters in dispute being determined by the Ministry of Health after consultation with the Ministry of Transport. The Bill was ordered to be reported to the House.

French Electrification Progress.—Electrification of the railway line from the Paris-Luxembourg terminus to Massy-Palaiseau (10½ miles) and the Branch from Bourg-la-Reine to Sceaux (2 miles) is now in progress. The line will be taken over from the Paris-Orleans-Midi Companies by the Paris-Metropolitain and operated as the first long-distance suburban extension of its system. The work is due for completion at the end of 1935. Level crossings on the route have already been abolished, this being an essential preliminary to operation by the Metro.

Plans for a terminal station at Massy-Palaiseau have not yet been approved, because there is talk of extending the electrification to Limours, a distance of 38 miles from Paris-Luxembourg. The decision of the Minister of Public Works on this proposal is awaited. The electric equipment of the line was begun on December 28 last, and the construction of the power substations is due to be completed in one year. The rolling stock will differ slightly from that now in use on the Metro. Trains will be similar to those in service on the Paris-Juvisy section of the Paris-Orleans lines.

N.S.W. Railways Quarterly Earnings.—Revenue of the New South Wales Railways for the quarter ended March 31, 1934, amounted to £3,696,893, a decrease of £287,760 in comparison with the corresponding period of 1933. In the expenditure of £2,522,200, however, there was a reduction of £349,525, and the operating ratio improved from 72.07 per cent. to 68.22 per cent. Train miles were 6,224,694, a decrease of

377,930, and the net earnings per train mile improved from 3s. 4½d. to 3s. 9½d. Passengers numbered 36,116,925, an increase of 3,820,774, and coaching revenue rose from £1,683,568 to £1,707,801. Goods train traffic receipts, however, at £1,812,761, showed a decrease of £301,087, the principal decrease being £419,175 in receipts from grain and flour, of which 458,083 tons less were carried.

British Standard Specifications for Building Works.—The British Standards Institution is adopting a new method of listing those of its specifications which apply to building and its allied trades, and has recently issued a new publication under the title "Schedule of British Standard Specifications applicable to Building Works" (reference CD 4000), setting forth the specifications under the usual trade headings in the order adopted in general specifications for building works. Copies may be had from the British Standards Institution, 28, Victoria Street, London, S.W.1.

British and Irish Railway Traffic Returns

GREAT BRITAIN	Totals for 27th Week			Totals to Date		
	1934	1933	Inc. or Dec.	1934	1933	Inc. or Dec.
L.M.S.R. (6,940½ mls.)						
Passenger-train traffic...	565,000	556,000	+ 9,000	11,683,000	11,552,000	+ 131,000
Merchandise, &c. ...	440,000	402,000	+ 38,000	11,993,000	10,942,000	+ 1,051,000
Coal and coke ...	188,000	179,000	+ 9,000	6,268,000	5,972,000	+ 296,000
Goods-train traffic ...	628,000	581,000	+ 47,000	18,261,000	16,914,000	+ 1,347,000
Total receipts ...	1,193,000	1,137,000	+ 56,000	29,944,000	28,466,000	+ 1,478,000
L.N.E.R. (6,339 mls.)						
Passenger-train traffic...	368,000	363,000	+ 5,000	7,496,000	7,433,000	+ 63,000
Merchandise, &c. ...	275,000	272,000	+ 3,000	8,346,000	7,514,000	+ 832,000
Coal and coke ...	193,000	181,000	+ 12,000	6,197,000	5,593,000	+ 604,000
Goods-train traffic ...	468,000	453,000	+ 15,000	14,543,000	13,107,000	+ 1,436,000
Total receipts ...	836,000	816,000	+ 20,000	22,039,000	20,540,000	+ 1,499,000
G.W.R. (3,750½ mls.)						
Passenger-train traffic...	241,000	248,000	- 7,000	4,844,000	4,882,000	- 38,000
Merchandise, &c. ...	176,000	167,000	+ 9,000	4,780,000	4,394,000	+ 386,000
Coal and coke ...	82,000	87,000	- 5,000	2,698,000	2,660,000	+ 38,000
Goods-train traffic ...	258,000	254,000	+ 4,000	7,488,000	7,054,000	+ 434,000
Total receipts ...	499,000	502,000	- 3,000	12,332,000	11,936,000	+ 396,000
S.R. (2,176 mls.)						
Passenger-train traffic...	341,000	333,000	+ 8,000	7,273,000	7,181,000	+ 92,000
Merchandise, &c. ...	55,000	52,000	+ 3,000	1,683,500	1,600,000	+ 83,500
Coal and coke ...	21,000	21,000	—	855,500	788,000	+ 67,500
Goods-train traffic ...	76,000	73,000	+ 3,000	2,539,000	2,388,000	+ 151,000
Total receipts ...	417,000	406,000	+ 11,000	9,812,000	9,569,000	+ 243,000
Liverpool Overhead ... (6½ mls.)	1,243	1,148	+ 95	30,047	29,566	+ 481
Mersey (4½ mls.)	4,123	3,913	+ 210	111,317	106,471	+ 4,846
*London Passenger Transport Board ...	552,100	500,100	+ 52,000	552,100	500,100	+ 52,000
IRELAND						
Belfast & C.D. pass. (80 mls.)	4,194	4,023	+ 171	57,679	58,910	- 1,231
" " goods	399	521	- 122	14,251	14,334	- 83
" " total	4,593	4,544	+ 49	71,930	73,244	- 1,314
Great Northern pass. (562 mls.)	15,050	13,050	+ 2,000	225,450	149,300	+ 76,150
" " goods	7,050	6,550	+ 500	221,100	149,350	+ 71,750
" " total	22,100	19,600	+ 2,500	446,550	298,650	+ 147,900
Great Southern pass. (2,158 mls.)	33,498	32,342	+ 1,156	581,507	562,091	+ 19,416
" " goods	31,341	26,784	+ 4,557	869,099	811,660	+ 57,439
" " total	64,839	59,126	+ 5,713	1,450,606	1,373,751	+ 76,855

* 1st week, the receipts for which include those of undertakings not absorbed by the L.P.T.B. in the corresponding period last year.

British and Irish Railway Stocks and Shares

Stocks	Highest 1933	Lowest 1933	Prices	
			July 11, 1934	Rise/Fall
G.W.R.				
Cons. Ord. ...	55½	31	53½	+2½
5% Con. Prefce. ...	109½	69½	113½	+1
5% Red. Pref. (1950) ...	109½	87½	109½	+1
4% Deb. ...	108½	99½	106½	+1
4½% Deb. ...	108	100½	108½	—
4½% Deb. ...	116	116	115½	—
5% Deb. ...	128	117½	126½	—
2½% Deb. ...	65	60	69½	—
5% Rt. Charge ...	124	111½	125½	—
5% Cons. Guar. ...	122	103	123½	—
L.M.S.R.				
Ord. ...	297½	121½	24	+2
4% Prefce. (1923) ...	51	17	51	+4½
4% Prefce. ...	72	33½	82	+4
5% Red. Pref. (1955) ...	93	47½	100½	+1½
4% Deb. ...	103½	89½	102½	+1
5% Red. Deb. (1952) ...	114	105	111½	—
4% Guar. ...	97½	68½	100	+1½
L.N.E.R.				
5% Pref. Ord. ...	22½	7½	18½	+1½
Def. Ord. ...	10½	4½	8½	+7½
4% First Prefce. ...	65½	19½	68½	+4
4% Second Prefce. ...	40½	12½	35	+3½
5% Red. Pref. (1955) ...	83½	27	86	+2
4% First Guar. ...	94½	58½	95	+1½
4% Second Guar. ...	89½	48	90½	+1½
3% Deb. ...	77	60½	76	—
4% Deb. ...	102½	80	101	+1½
5% Red. Deb. (1947) ...	112	102½	108½	—
4½% Sinking Fund Red. Deb. ...	107½	98½	106½	—
SOUTHERN				
Pref. Ord. ...	71	27½	80	+2
Def. Ord. ...	24½	9½	26½	+2
5% Prefce. ...	107½	74	113	+2
5% Red. Pref. (1964) ...	107½	78½	111½	—
5% Guar. Prefce. ...	124½	102½	124½	—
5% Red. Guar. Pref. (1957) ...	115½	103½	114½	—
4% Deb. ...	107½	96½	104½	+1½
5% Deb. ...	126½	114½	126½	—
4% Red. Deb. ...	107½	100	107½	+1
1962-67				
BELFAST & C.D.				
Ord. ...	6	4	5	—
FORTH BRIDGE				
4% Deb. ...	99½	95½	101½	—
4% Guar. ...	98½	94	100½	—
G. NORTHERN (IRELAND)				
Ord. ...	71½	31½	5	—
G. SOUTHERN (IRELAND)				
Ord. ...	28	16	14	—
Prefce. ...	24	12½	17	—
Guar. ...	42	16½	44	—
Deb. ...	60	30½	63½	-1½
L.P.T.B.				
4½% "A" ...	117½	112	117	—
5% "A" ...	119½	119½	127	—
4½% "T.F.A." ...	111½	106	109	—
5% "B" ...	122½	114	121	—
5% "C" ...	86½	74½	81½	+1
MERSEY				
Ord. ...	161½	5	131½	+1½
4% Perp. Deb. ...	83	63½	86½	-1
3% Perp. Deb. ...	62	51	64½	-1
3% Perp. Prefce. ...	50½	27	52½	—

* ex-dividend

CONTRACTS AND TENDERS

Enquiries for a total number of 94 locomotives for overseas and home railways have been made within the last week or two.

The Butler Machine Tool Co. Ltd. has received an order from the G.W.R. for a 24-in. axle-box planing machine.

Bullers Limited has received an order from the South African Railways and Harbours Administration for insulators to a total value of £686 5s. 0d. (Tender No. B6110/1).

Locomotives for Palestine

Nasmyth Wilson & Co. Ltd. has received orders through the Crown Agents for the Colonies for two 0-6-0T shunting locomotives and 12 large locomotive boilers for the Palestine Railways.

Burton Griffiths & Co., Ltd. has secured an order from the Great Western Railway for two automatic screwing machines for Swindon works.

The Principality Wagon Co., Ltd., has secured an order from the Great Western Railway for six 6/8 ton movable rubber-floored bodies for Thornycroft chassis.

Harland & Wolff Limited has received an order from the Nyasaland Railways for one steel motor coaster having a length of 105 ft., and 8 ft. draught for service on Lake Nyasa.

Leyland Motors Limited has recently received the following orders:—

C.I.T.A. (a subsidiary of the Buenos Ayres & Pacific Railway): Eight Tigers fitted with oil engines.

Great Southern Railways of Ireland: 16 forward-controlled Cub six-wheeled vehicles.

New South Wales Government Railways: Five Titans.

South African Railways and Harbours Administration: Goods and passenger chassis.

Great Northern Railway of Ireland: Six Tigers.

L.N.E.R. Purchases Diesel Railbus

The L.N.E.R. has purchased from Sir W. G. Armstrong Whitworth & Co. (Engineers) Ltd., a 100-h.p. 60-seater diesel-electric streamlined railbus. This vehicle, which has been on trial since September, 1933, is to be employed in the Scarborough district during the summer and, when necessary, will duplicate the *Tyneside Venturer* diesel railcar which works a circular tour every weekday from Scarborough via Pickering, Whitby and the Coast Line. During the remainder of the year the railbus will be used to supplement the regular services on the Carlisle, North Wylam and Blackhill branches.

The Pulsometer Engineering Co. Ltd. and the English Electric Co. Ltd. have secured orders respectively from the Great Western Railway for electrically-driven pumping plant and electrical equipment for No. 4 power station, Cardiff Docks. An order has also been placed with Johnson & Phillips Limited for a high-tension switchboard for Swansea North Dock sub-station.

The Argentine State Railways Administration is calling for tenders, to

be presented in Buenos Aires by August 20, for the supply of 6,292 helical springs for railway wagon bogies, couplings, buffers, &c. Firms desirous of offering springs of United Kingdom manufacture can obtain further details from the Department of Overseas Trade.

Important Indian Orders

W. G. Bagnall Limited has received an order from the Junagad State Railway for three metre gauge 4-6-0 saturated steam locomotives having two cylinders 14½ in. diam. × 22 in. stroke, coupled wheels 4 ft. diam., boiler pressure 180 lb. per sq. in. and 2,200 galls. water and 4 tons coal capacity tenders. The locomotives will be constructed to the inspection of Messrs. Robert White & Partners, consulting engineers.

The Tees Side Bridge & Engineering Works Limited has received an order from the Bengal-Nagpur Railway for 2,000 carriage and wagon drawbars.

Burn & Co. Ltd. and Henry Williams (India) (1931) Limited have received orders from the Eastern Bengal Railway for broad gauge points and crossings at prices of Rs. 19,235 and Rs. 19,228.

A. C. Bottomley & Co. Ltd. has received an order from the Great Indian Peninsula Railway for 375 cast steel locomotive coupled wheel axleboxes to be manufactured by S.A. Union de Acieries.

J. Stone & Co. (India) Ltd. has received orders from the Indian Stores Department for 15 sets of 38 cells alkaline train-lighting batteries, S.A.F.T. Company's nickel iron type SIOF, 315 amp. hr. capacity.

John Baker & Bessemer Limited has received an order for 400 carriage and wagon tyres for the Bombay Baroda & Central India Railway to the inspection of the consulting engineers Messrs. Rendel Palmer & Tritton.

Alfred Herbert (India) Limited, has received an order from the Indian Stores Department for two portable diesel-driven Holman HSCP air compressors and spares at a cost of Rs. 13,684 and Rs. 434 f.o.r. Karachi respectively.

The Chinese Government Purchasing Commission, on behalf of the Ministry of Railways, China, has placed orders with Sir Wm. Arrol & Co. Ltd. for one 60-ton, two 10-ton and two 5-ton overhead travelling cranes, and with C. M. Hill & Co. Ltd. for one slot-drilling machine to the inspection of Messrs. Fox & Mayo, consulting engineers.

With the passing of the Egyptian State Railways budget a grant is now available for further work on the Abu-Zaabal new locomotive shops.

Tenders are invited by the Egyptian State Railways Administration receive-

able at the General Management, Cairo Station, for one 40-ton self-propelling steam break-down crane with match truck. Firms interested should communicate direct with the Chief Inspecting Engineer, 41, Tothill Street, London, S.W.1.

Ten Sentinel Railcars for Egypt

The Sentinel Waggon Works Limited has secured an order from the Egyptian State Railways Administration for 10 Sentinel-Cammell steam railcars. It will be recalled that tenders, closing on February 15, for eight steam railcars, were invited in the open market. The cars to be supplied will be of the articulated type, mounted on three bogies, the two outer bogies being fitted with six-cylinder single-acting engines, developing about 325 b.h.p. A Woolnough No. 6 water-tube boiler working at 335 lb. per sq. in. pressure, and capable of delivering 6,000 lb. an hour of steam at high superheat, will be used. The bodies, to be built by the Metropolitan-Cammell Carriage Wagon & Finance Co. Ltd., will be of steel construction, giving seating accommodation for 16 second and 98 third-class passengers, and will have luggage and lavatory compartments also. The price for each car is £E.6,630, and delivery of the first car is to be made in 32 weeks, and the remainder at the rate of one car a week thereafter.

The Egyptian State Railways Administration has also placed the following contracts:—

The Henricot Steel Foundry: Buffers (Ref. No. E.S.R. 21.152. Total cost, £335).

S. A. Gilsoo: 800 metric tons screwspikes for track. (Ref. No. E.S.R. 302 G.3/1D. Price, £E.10,772 mills per ton Gabbarly Quay.)

Stahlwerks Verband: 165 metric tons V.47 flat bottomed rails at £E.8,940 mill per metric ton, and 2,900 metric tons V.42 at £E.8,610 mills per metric ton delivered Gabbarly Quay. (Ref. No. E.S.R. 302G 3/1E.)

Tittian Trackwork Co. Ltd.: Steel crossings. (Ref. No. E.S.R. 2.2. Total cost, £2,926 10s. 0d., delivered f.o.b. Manchester.)

H. J. Skelton & Co. Ltd.: Steel joists. (Ref. No. E.S.R. 1.134. Total cost, £1,172 19s. 8d. delivered f.o.b. Hull-Middlesbrough-Glasgow.)

Siemens Brothers & Co. Ltd.: Cable (Ref. No. E.S.R. 3078, cost £210 17s. 6d. delivery f.o.b. London).

Société Commerciale de Belgique: 175 metric tons V.47 and 90 metric tons V.42 steel fishplates (Ref. No. E.S.R. 302 G.3/1 B, total cost £E.3,391.750 mills, delivered Gabbarly Quay, Alexandria); 400 metric tons type C (at £E.9,500 mills per metric ton) and 280 metric tons type D (at £E.9,600 mills per metric ton, delivered Gabbarly Quay (Ref. No. E.S.R. 302 G.3/1 C).

Silvertown Lubricants Limited: Compound cylinder oil at £17 0s. 9d. per metric ton, delivered f.o.b. London (Ref. No. E.S.R. 359 G.3/1/5).

Diesel Railcar Orders

Ganz & Co. has received an order from the Egyptian State Railways Administration for 10 double-bogie diesel-mechanical railcars. These cars, the tenders for which were due on March 31 last, will have Ganz-Jendrassik heavy oil engines of 200 b.h.p. at 1,250 r.p.m., and straight mechanical drive. The cars will be 72 ft. 2 in. over body, which will be streamlined and of steel construction, and will accommodate 71 passengers. Air-conditioning plant and cold drinking water fountains will be provided. The unit price of these cars is £7,585, and it is understood that a condition of the order is that, should

OFFICIAL NOTICES

Bengal-Nagpur Railway Company Limited.

The Directors are prepared to receive Tenders for:—
HIGH TENSION ARMoured 3-CORE CABLE AND JOINT BOXES.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after Tuesday, 10th July, 1934.

A fee of 10s. will be charged for each copy of the Specification, which is **NOT** returnable.

Tenders must be submitted not later than NOON on Thursday, 19th July, 1934.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
R. GRANT,
Secretary.

THE ASSAM-BENGAL RAILWAY CO. LTD.
is prepared to receive Tenders for:—
DOGSPIKES.

Specifications and Tender Forms may be obtained at the Offices of the Company, Bishopsgate House, 80, Bishopsgate, E.C.2. A fee of £1 1s. is charged for each Specification, which cannot, under any circumstances, be returned. Tenders must be delivered at the Company's Offices not later than 10 a.m. on Thursday, the 2nd August, 1934.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,
W. H. J. GORE,
Secretary.

11th July, 1934.

Bombay, Baroda & Central India Railway Company

NOTICE is hereby given that the One Hundred and Forty-Seventh General Meeting of the Bombay, Baroda & Central India Railway Company will be held at Southern House, E.C. (formerly Cannon Street Hotel), on Wednesday, the 25th July, at 1 o'clock precisely.

(1) To receive the Directors' report and accounts.

(2) To declare a dividend.

(3) To transact the general business of the Company.

Warrants for the guaranteed interest and dividend will be forwarded on the 25th day of July to Stockholders registered in the Company's books on the 30th day of June, 1934.

By Order,
S. G. S. YOUNG,
Secretary.

N.B.—A copy of the Directors' report and accounts can be obtained by any Stockholder on application to the Secretary.

Offices:
The White Mansion,
91, Petty France,
Westminster, S.W.1.
9th July, 1934.

**Universal Directory of Railway Officials
and Railway Year Book**
40th Annual Edition, 1934-35.
Price 20/- net. Now Ready.

THE DIRECTORY PUBLISHING CO. LTD.,
33, Tothill Street, London, S.W.1.

The Rohilkund & Kumaon Railway Company Limited.

The Directors are prepared to receive Tenders for the supply of:—
400 PAIRS WHEELS AND AXLES FOR WAGONS

as per Specification to be seen at the Company's Offices.

Tenders addressed to the undersigned, and envelope marked "Tender for Wheels and Axles," with name of firm tendering, to be lodged not later than noon on the 31st day of July, 1934.

For each Specification a fee of £1 will be charged which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any Tender.

By Order of the Board,
W. R. IZAT,
Secretary.

237, Gresham House,
Old Broad Street,
London, E.C.2.
10th June, 1934.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—*The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

the first two cars prove unsuitable for the conditions, or in any way unsatisfactory, the contract for the remainder will be cancelled. These cars were primarily intended for service on the new Cairo-Suez line, but, as the number of cars has been increased from that originally proposed, it is evidently intended to use them for general purposes where traffic available does not call for steam trains. The cars should also prove useful for the Mersa-Matruh line, later to be completed. With the exception of a benzol-electric train purchased in 1913, the Egyptian State Railways Administration has not so far had any experience of internal-combustion-engined railcars.

The Egyptian State Railways Administration has placed the undermentioned orders for petrol-engined bus chassis, following on the call for tenders due on March 17:—

John I. Thornycroft & Co. Ltd.: 20 E.E.S.C.6 type chassis at a unit cost of £E.644.
Levland Motors Limited: Ten L.K.P.3 chassis at a unit cost of £E.582.

Spare engines and certain accessories for each type are also ordered.

The Bombay, Baroda & Central India Railway invites tenders receivable at the White Mansion, 91, Petty France, Westminster, S.W.1, by July 20, for a motor-driven air compressor.

The Bengal-Nagpur Railway invites tenders receivable by July 19, at 132, Gresham House, Old Broad Street, London, E.C.2, for high-tension armoured three-core cable and joint boxes.

Samuel Osborn (India) Limited has received orders from the Indian Stores Department for 400 buffer plungers at a cost of Rs. 6,267, 400 buffer spindles at a cost of Rs. 1,200, 400 buffer plunger plugs at a cost of Rs. 400 and 400 buffer

casings at a cost of Rs. 4,933 free delivery East Indian Railway Stores, Hewrah.

The Agent, Great Indian Peninsula Railway, Bombay, invites tenders receivable by August 1 for a white-metal-plant for Jhansi shops.

The Secretary, Stores Purchase Committee, Government of Mysore, Bangalore, invites tenders receivable by August 10, for railway workshop machinery required during 1934-35.

The Chief Controller of Stores, Indian Stores Department (Engineering Section), Simla, invites tenders receivable by August 2 for two hand operated metre gauge engine turntables for the Jodhpur Railway. Tenders are also invited, receivable by August 30 for train and locomotive head and cab electric lamps required for the period November 1, 1934, to October 31, 1935.

The Argentine State Railways Administration is calling for tenders, to be presented in Buenos Aires by August 27, for the supply of vertical lathes. Firms desirous of offering lathes of United Kingdom manufacture can obtain the further details of this call for tenders from the Department of Overseas Trade.

Diesel-electric Railcars for Belgium

The Société Nationale des Chemins de Fer Belges is calling for tenders to be presented in Belgium by July 24, for 12 diesel-electric railcars, each consisting of three coaches. The cars are to be driven by two diesel engines of at least 400-h.p. each. The maximum speed on a straight and level track is fixed at 150 km. per hour. Firms desirous of offering railcars of United Kingdom manufacture can obtain further

details from the Department of Overseas Trade.

The Assam-Bengal Railway invites tenders receivable by August 2, as shown in the Official Notices section above, for the supply of dogsplikes.

The Rohilkund & Kumaon Railway invites tenders receivable by July 31, as shown in the Official Notices section above, for 400 pairs of wheels and axles for wagons.

The Quarantine Board at Alexandria is calling for tenders, to be presented in Egypt by August 29, for the supply and delivery of 1,500 m. of Decauville track of 60 cm. gauge, consisting of rails of 14 kg. on steel sleepers, with all necessary accessories for assembling 16 complete sets of points and crossings for the above track. Firms desirous of offering track work of United Kingdom manufacture can obtain further details from the Department of Overseas Trade.

Kenneth R. Pearson & Son has taken over the agency for Freins Jourdain Monneret, makers of Lambert sanding gear for locomotives and of vacuum brake equipment, consequent on J. F. Wolff & Co. Ltd., who previously held this agency, having now retired from business. All enquiries concerning this locomotive sanding gear and vacuum brake equipment should in future be addressed to Kenneth R. Pearson & Son, 32, Victoria Street, Westminster, S.W.1. Telephone No. Victoria 1882.

Percy Grant & Co., of Buenos Aires, has been reappointed Agent of Beyer, Peacock & Co. Ltd., for Argentina, Uruguay, Paraguay, and Bolivia, and George Kenrick & Co., of Santiago, for Chile.

Railway Share Market

The stock and share markets have not displayed as much activity as in former weeks except in Home railway stocks, where there has been a welcome renewal of interest. To some extent this has been stimulated by more encouraging hopes of progress towards an early settlement or compromise in regard to the wages dispute between the companies and the representatives of the Trades Unions, but mainly it is attributable to the forthcoming issue of interim statements by the companies. These are due on the 26th and 27th instant, and there has been a lively exchange of views in various quarters as to their probable character.

It is hardly necessary to emphasise that any estimates as to the interim dividends to be declared must be largely in the nature of guesswork. Current market estimates exercise, however, an influence on quotations, and for what they are

worth may be repeated here. The Stock Exchange estimate is that the L.M.S. is earning the full dividends on the 5 per cent. redeemable preference stock and the 4 per cent. first preference stock, but that as a measure of precaution the directors may restrict the half-yearly dividends to slightly less than the full amount and give an indication that the balance may be paid with the final dividend unless there is some check to present progress. In the case of the Southern, it is being expected that a small interim dividend will this time be paid on the preferred ordinary stock, which did not receive any payment as an interim distribution a year ago. It is estimated that 3 per cent. is being earned on this stock at present. On L.N.E.R. 1st preference stock it is also estimated that the full dividend is being now earned, but a distribution of not more than 1 per cent. as interim is being reckoned on. The Great Western interim

dividend of a ½ per cent. on the ordinary stock is expected to be repeated. It will be gathered that recent purchases have been made of the foregoing stocks not so much on account of the actual dividend likely to be paid for the half-year as on the prospect of the complete year showing sufficiently satisfactory results to justify a larger payment next February. The usual Stock Exchange practice is to discount prospects many months in advance. London Passenger Transport "C" stock improved on more optimistic views regarding the dividend.

In foreign railways there has been no outstanding feature. Leopoldina 4 per cent. debenture stock fell four points following the statements made at the meeting. Argentine stocks were irregular and there was some selling on fears that the new methods commencing this week of stating traffic receipts would cause misapprehension to shareholders who have not fully realised the exchange position.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1933-34	Week Ending	Traffic for Week		No. of Week	Aggregate Traffic to Date			Shares or Stock	Prices				
			Total this year	Inc. or Dec. compared with 1933		Totals		Increase or Decrease		Highest 1933	Lowest 1933	July 11, 1934	Yield % (See Note)	
						This Year	Last Year							
South & Central America.														
Antofagasta (Chili) & Bolivia	830	8.7.34	£ 13,790	+ £ 4,620	27	£ 352,070	£ 270,010	+ £ 82,060	Ord. Stk.	26	115½	21	Nil	
Argentine North Eastern ..	753	7.7.34	7,614	+ 3,215	1	7,614	10,829	+ 3,215	—	14½	5	50	8	
Argentine Transandine ..	111	—	—	—	—	—	—	—	A. Deb.	55	4	8	Nil	
Bolivar	170	June, 1934	5,100	+ 250	26	38,750	42,000	- 3,250	6 p.c. Db.	10	5	10	Nil	
Brazil	—	—	—	—	—	—	—	—	Bonds.	15	11	13	37½	
Buenos Ayres & Pacific ..	2,806	7.7.34	70,201	- 25,903	1	70,201	96,104	- 25,903	Ord. Stk.	30	97½	11	Nil	
Buenos Ayres Central ..	190	20.5.34	£115,700	- £8,600	47	£5,015,653	\$4,906,639	+ \$109,014	Mt. Db.	26	10	21	Nil	
Buenos Ayres Gt. Southern ..	5,085	7.7.34	121,438	- 72,471	1	121,438	193,909	- 72,471	Ord. Stk.	44½	21½	25½	Nil	
Buenos Ayres Western ..	1,926	7.7.34	45,949	- 23,923	1	45,949	69,872	- 23,923	"	34½	15½	19½	Nil	
Central Argentine ..	3,700	7.7.34	125,327	- 52,788	1	125,327	178,115	- 52,788	"	28½	15	15½	Nil	
Do. ..	—	—	—	—	—	—	—	—	Dfd.	18	10	8	Nil	
Cent. Uruguay of M. Video	273	7.7.34	15,506	- 2,911	1	15,506	18,417	- 2,911	Ord. Stk.	20	8	10½	Nil	
Do. Eastern Extn. ..	311	7.7.34	2,746	- 107	1	2,746	2,853	- 107	—	—	—	—	—	
Do. Northern Extn. ..	185	7.7.34	1,795	- 442	1	1,795	2,237	- 442	—	—	—	—	—	
Do. Western Extn. ..	211	7.7.34	1,002	- 309	1	1,002	1,311	- 309	—	—	—	—	—	
Cordoba Central	1,218	7.7.34	36,100	- 6,680	1	36,100	42,780	- 6,680	Ord. Inc.	91½	21½	5	Nil	
Costa Rica	188	Apr., 1934	14,704	- 950	43	181,164	194,290	- 13,126	Stk.	29	20	26½	79½	
Dorada	70	June 1934	8,800	- 100	26	60,200	44,100	+ 16,100	1 Mt. Db.	76½	68½	95	65½	
Entre Rios	810	7.7.34	9,518	- 5,326	1	9,518	14,844	- 5,326	Ord. Stk.	26½	9	14½	Nil	
Great Western of Brazil ..	1,082	7.7.34	6,600	+ 800	27	215,800	282,000	- 66,200	Ord. Sh.	23½	12	5½	Nil	
International of Cl. Amer.	794	May, 1934	\$475,123	- \$28,902	21	\$2,466,673	\$2,282,410	+ \$184,263	—	—	—	—	—	
Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	12	116	19	Nil	
La Guaira & Caracas ..	223½	June, 1934	3,880	+ 130	26	21,435	36,270	- 14,835	Stk.	16	10	8½	Nil	
Leopoldina	1,918	7.7.34	29,915	+ 7,508	27	585,412	616,695	- 31,283	Ord. Stk.	20½	10	8	Nil	
Mexican	483	7.7.34	\$211,700	+ \$18,500	1	\$211,700	\$193,200	+ \$18,500	—	3	12	2½	Nil	
Midland of Uruguay ..	319	June, 1934	8,199	- 242	52	111,908	102,566	+ 9,342	Ord. Stk.	2	1	1½	Nil	
Nitrate	401	30.6.34	9,588	+ 2,557	26	138,664	55,098	+ 83,566	Ord. Sh.	78½	11½	25	Nil	
Paraguay Central ..	274	7.7.34	4,360	+ 180	1	4,360	4,180	+ 180	Pr. Li. Stk.	72	49½	72	85½	
Peruvian Corporation ..	1,059	June, 1934	54,342	- 7,778	52	674,250	624,537	+ 49,713	Pref.	15½	5	12	Nil	
Salvador	100	30.6.34	672	- 142	53	76,087	139,058	- 62,971	Pr. Li. Db.	70	66½	70	7½	
San Paulo	153½	7.7.34	31,400	- 1,955	26	801,187	794,669	+ 6,518	Ord. Stk.	102	68	74	5½	
Taital	164	June, 1934	5,950	+ 105	52	69,595	44,295	+ 25,300	Ord. Sh.	15½	5½	15½	51½	
United of Havana ..	1,365	7.7.34	17,711	+ 1,942	1	17,711	15,769	+ 1,942	Ord. Sh.	8	2	4	Nil	
Uruguay Northern ..	73	June, 1934	978	+ 35	52	13,533	16,440	- 2,907	Deb. Stk.	6	3½	4½	Nil	
Canada.														
Canadian National ..	23,748	30.6.34	896,496	- 26,579	26	15,899,349	13,494,974	+ 2,404,375	—	—	—	—	—	
Canadian Northern ..	—	—	—	—	—	—	—	—	Perp. Dbs.	60½	38	67	51½	
Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	99½	85	102½	37½	
Canadian Pacific ..	17,018	7.7.34	468,400	+ 5,200	27	11,910,400	10,608,000	+ 1,302,400	Ord. Stk.	22½	11	14	Nil	
India.														
Assam Bengal	1,329	9.6.34	27,187	+ 4,595	10	278,302	215,940	+ 62,362	Ord. Stk.	79	70	77½	37½	
Barsi Light	202	16.6.34	2,970	+ 270	11	35,490	34,170	+ 1,320	Ord. Sh.	101½	70	100½	6	
Bengal & North Western ..	2,112	16.6.34	53,871	+ 1,508	11	597,198	598,380	- 1,182	Ord. Stk.	292	240	273½	57½	
Bengal Doonars & Extension	161	9.6.34	2,574	- 238	10	22,672	23,721	- 1,049	"	127	119	125	58½	
Bengal-Nagpur	3,269	9.6.34	114,450	- 425	10	1,228,425	1,072,855	+ 155,570	"	97½	83½	101½	315½	
Bombay, Baroda & Cl. India	3,089	30.6.34	146,550	- 8,025	13	2,202,750	2,126,325	+ 76,425	"	112	107	109½	51½	
Madras & South'n Mahatras	3,230	9.6.34	112,050	- 26,524	10	1,222,950	1,210,214	+ 12,736	"	127	114½	124½	71½	
Rohilkund & Kumaon ..	572	16.6.34	9,268	- 1,561	11	121,470	118,722	+ 2,748	"	260	225	249	6	
South India	2,526	9.6.34	86,973	- 1,342	10	832,601	799,565	+ 33,036	"	119½	112	115½	615½	
Various.														
Beira-Umtali	204	Apr., 1934	50,002	+ 10,132	30	340,976	274,597	+ 66,379	—	—	—	—	—	
Bilbao River & Cantabrian	15	June, 1934	1,358	- 361	26	10,459	8,063	+ 2,396	—	—	—	—	—	
Egyptian Delta	621	20.6.34	5,586	+ 804	12	42,025	40,962	+ 1,063	Pr. Sh.	131½	15½	17½	50½	
Great Southern of Spain ..	104	30.6.34	1,726	+ 114	26	56,304	53,982	+ 2,322	Inc. Deb.	4	3	3½	Nil	
Kenya & Uganda ..	1,625	Mar., 1934	240,520	+ 21,064	12	638,137	606,192	+ 31,945	—	—	—	—	—	
Manila	—	—	—	—	—	—	—	—	B. Deb.	53	33½	42½	81½	
Mashonaland	913	Apr., 1934	93,558	+ 27,374	30	624,162	428,719	+ 195,443	1 Mg. Db.	91½	42	92½	53½	
Midland of W. Australia ..	277	May, 1934	12,136	- 1,095	48	146,177	144,075	+ 2,102	Inc. Deb.	89	70	97½	41½	
Nigerian	1,903	19.5.34	27,584	+ 4,814	7	190,762	168,221	+ 22,541	—	—	—	—	—	
Rhodesia	1,538	Apr., 1934	154,881	+ 30,683	30	1,064,725	782,586	+ 282,139	4 p.c. Db.	98½	80½	101	315½	
South African	13,180	16.6.34	505,047	+ 26,012	11	5,229,135	4,528,599	+ 700,536	—	—	—	—	—	
Victorian	6,172	Apr., 1934	693,410	- 69,054	43	7,335,168	7,788,758	- 453,590	—	—	—	—	—	
Zafra & Huevla	112	May, 1934	11,081	+ 415	21	55,722	52,126	+ 3,596	—	—	—	—	—	

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1½.

† Receipts are calculated @ 1s. 6d. to the rupee.

§ ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rate of exchange and not on the par value.

(See
Note)

Nil
Nil
9
Nil
378
Nil
Nil
Nil
Nil
Nil
Nil
Nil
Nil
Nil

Nil
79,6
6,16
Nil
Nil

Nil
Nil
Nil
Nil
Nil
Nil
85,6
Nil
718
558
51,16
Nil
Nil

51,16
378
Nil

378
6
578
558
315,6
51,2
714
6
615,6

55,6
Nil

814
558
418
315,6

change